RAILROAD GAZETTE

FRIDAY, NOVEMBER 2, 1900.

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Contributions

The Barschall Joint.

New York, Oct. 24, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I note Mr. Barschall's letter in your issue of Oct. 19. criticising my comments on his and the N. Y. P. & O. rail joints.

The fact that the four edges or bearing surfaces of the filler in the Barschall joint are narrow and rounded, thereby becoming polished under traffic, simply shows that they are subjected to a wear they would be better capable of resisting were they of different shape. Mr. Barschall has himself offered a severe criticism of his design in stating that his filler becomes polished in service.

The point at which a wheel reaches the full cross-section of the auxiliary rail, and therefore comes to a full bearing on it, is over a tie. Consequently, both main and auxiliary rail must be on the same foundation and be at the same level. Now, if a wheel, worn as shown in my sketch, can rise high enough to allow the unworn portion to ride on the auxiliary rail without being lifted ¼ in., an explanation as to how it is done without shock or deterioration to rolling stock, would make pleasant reading. I reiterate my statements that there is but one condition of wheel and rail at which the joint does its work perfectly and that no joint should alter the running width of rail head.

Unfortunately, I am not at liberty to give some figures I have showing the enormous wear of auxiliary rails after short service, nor am I at liberty to show other ways in which they have failed under my personal observation. I can only say they have failed.

F. C. SCHMITZ.

Highway Crossing Bells.

Boston, Oct. 15, 1900.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I have read with much interest the recent articles in your paper on "Highway Crossing Bells," but these seem to me to take an incomplete and somewhat unsatisfactory view the case. There are several motives which might induce railroad companies to instal highway crossing alarms, but by far the most important is the safety to life and property, and this is often the only one.

One of your articles seems to indicate that the author thinks automatic alarms are so unreliable as to be more plague than profit. It is true that there are devices of this kind of such imperfect design and construction, or so carelessly maintained, that they afford little or no protection in any efficient sense, but that this is a necessity of their use the writer does not believe, nor has his experience tended that way. He has had a practical experience of more than twenty years with different kinds of highway crossing alarms, and during this time, he believes, the percentage of failures on this kind of apparatus has been as small as with any other kind of apparatus of a similar nature. He is, however, thoroughly convinced that apparatus used for signaling on a railroad needs more careful inspection and more intelligent care than it usually receives, and highway crossing alarms are not an exception to this rule. The fact that the alarm can be placed at the crossing and worked for months with no attention, and without a failure, is no argument that it ought not to be frequently examined and well cared for. Inefficient maintenance is more often responsible for unsatisfactory service than defective design (though this also comes in for its share of responsibility), but there is to be obtained apparatus so well adapted for this service that there is no excuse for using that which is not so constructed. Intelligent oversight would do away with most of the failures and complaints of unsatisfactory service.

During more than twenty years the writer calls to mind but three fatal accidents occurring in his own experience at highway crossings protected by alarms, where the failure of the alarms was claimed as a contributing cause, and in but one case was this shown with reasonable probability. In this instance a defective arrangement of circuits was found in the plan for operating two alarms from the same batteries where such a failure could have happened. A small change in the wiring removed the trouble. He does believe most strongly that many lives and much property have been saved by the use of highway crossing bells, which he is glad to see is increasing. He is of the opinion that a moderate law requiring the use of some kind of alarm approved by the Railroad Commissioners or other competent authority at all crossings of public highways which are not otherwise protected (or specially exempted for some sufficient reason), would go far to prevent the disasters so frequent at unprotected crossings. He believes there would be greater safety with an efficient automatic alarm than with gates and a flagman when but one of these safeguards is to be provided. If both can be used he thinks a crossing will be more safely guarded than with either alone, but in this case the alarm serves more the purpose of warning the gateman than for the general public.

If the use of alarms is made compulsory there should be a change in the law of liability of railroad companies for accidents at highway crossings, or in public sentiment regarding them, or in both, so that at a crossing protected by an efficient alarm the responsiblity for an accident should rest on the person using the highway when the alarm indicated the approach of a train, and the collection of damages should be impossible; also, it should be made a misdemeanor to drive upon a railroad track when the alarm was sounding (whether or not an accident resulted), without first stopping a sufficient time to ascertain whether a train was actually approaching, or there was an accidental derangement of the apparatus. Avoidable neglect to keep such apparatus in good working order should be punishable by fines in proportion to the circumstances of the case.

The writer believes, therefore, that from a humanitarian and economic point of view the use of highway alarms should be greatly extended, but not generally with the idea of reducing the amount of damages in case of accident, because, paradoxical as it may seem, he believes that in the present state of the law and public opinion, the amount recovered may even be greater at a crossing protected by an alarm than would be the case if none were provided. It is often construed as a significant admission on the part of the railroad company that there is a point of peculiar danger, and the fact that an accident has happened there in the opinion of the average juror fastens the blame on the railroad company for not providing more adequate or efficient protection at "such a dangerous place."

It may happen that the warning was faithfully given, but not heeded. It may be that the party injured was fully aware of the approach of a train, but took the risk of meeting it on the crossing. In the case of a fatal accident this cannot usually be proved, and this could rarely be done in other cases, because there can almost always be found parties who were in the vicinity at the time, and who did not hear the alarm for that particular train, and are therefore certain that it was not given; who can remember with a distinctness proportional to the amount of damages claimed, that they have frequently known the alarm to fail, and have seen the railroad company's men making repairs soon after the accident. With such evidence the lawyer who makes a business of trying cases for personal injury in railroad accidents can convince jurors of the kind who too often sit on such cases, that damages should be awarded the injured party sufficient to provide for his maintenance in comfort, if not luxury, for the remainder of his probable life.

A number of instances of this kind have come within the writer's personal knowledge. In two cases damages were awarded where the gates at a crossing were closed, and in one of these instances a verbal warning was given by the flagman in addition to the silent one conveyed by the gates being closed. In this case a freight and an express train were approaching the crossing on different tracks. The slow moving freight hid the view of the rapidly approaching express. The argument of the prosecuting attorney, and the view of the jury, was to the effect that the gates were a sufficient warning against the train which could be seen (and was easily avoided), but not against the one which was invisible, and from which, when once in its path, there was no escape. It is no wonder if in many cases a railroad company should prefer to take the chance of a possible hostile prejudice on the part of a judge, to the almost certain adverse decision of a jury, and as often as possible to have such cases tried without a jury. It occasionally happens that the judge so carefully informs the jury what are just and sufficient grounds on which to base a verdict against the company, that an acquittal follows as a necessary consequence, or definitely instructs the jury to find for the defendant, but the instances are much more common where the instructions to the jury are so indefinite and ambiguous that one view would agree quite as well as another with their import. When this is the case the result is usually a foregone conclusion. In rare cases there is a manifest hostility on the part of the judge towards the corporation, and again rich damages are likely to be awarded, from which, in most cases, there is no appeal.

It is well, therefore, to consider whether it is not better worth while to spend a large sum, even if borrowed at a high rate of interest, to abolish the crossing than to spend a less amount for equipping a really dangerous crossing with an automatic alarm, or for providing gates and a flagman at a considerable annual expense for maintenance. When, however, as in some states, parties using the highway grade crossing of a railroad are required to take reasonable precautions for their own safety, the use of an efficient alarm will almost entirely prevent the award of damages for an accident, and will, therefore, prove a profitable investment.

Railroad companies have a moral obligation to protect the lives and property of the public who use the railroad or the streets leading over it to every reasonable degree, whether or not the amount of money spent is greater than would be obtained for awards of damages, and therefore the writer would be glad to see a state law compelling the use of that kind of protection best adapted to the particular situation at every highway grade crossing over a railroad where passenger trains are run, and in cases where the street is not definitely limited, at crossings of electric roads also, but with such safeguards for the companies that obey the law, as will prevent the recovery of damages for accidents where the negligence of the party himself was the principal cause, and damages only to the degree of negligence proved on the part of the railroad company, when the responsibility is divided and there was "contributory negligence" on the part of the individual. GEO. W. BLODGETT.

The Fast Camden-Atlantic City Trains.

The summer trains run by the Pennsylvania Railroad and by the Philadelphia & Reading Railroad between Philadelphia and Atlantic City have become famous all over the world as being the fastest trains ever run in regular service. For two summers they have kept up a performance extraordinary in weight of train, speed and punctuality. We shall give below some particulars, giving first data concerning the trains run by the Pennsylvania Railroad (the West Jersey & Seashore).

The Pennsylvania's Fastest Trains.

It will be observed that these trains are scheduled at various speeds running from 60.3 miles an hour up to 66 miles an hour, this rate being maintained from start to stop for a distance of 58.3 miles. It will be seen also that short distances have been run at speeds of from 80 to 90 miles an hour, and indeed, we find two records of seven miles at 93 miles an hour, and it will be observed that none of these trains were light. Obviously, no management would undertake to establish and keep up a schedule calling for such speeds unless the equipment and track were adequate. The West Jersey & Seashore has probably as good a track as can be found anywhere in the world. This is the line on which gravel ballast, oiled, was used for a time, but we believe that it is stone ballasted now throughout and as a matter of course it is thoroughly signaled. Before we leave this part of the subject we may add that the Reading track and signals (Atlantic City Railroad) are quite equal to those on the West Jersey & Seashore, and these fast trains on both roads are fitted with the Westinghouse high-speed brake attachment.

The little table below shows the engines by class and number hauling these trains. The Class E-1 engine was illustrated and described in the *Railroad Gazette*, July 7, 1899. It is an Atlantic type engine, single expansion, with 20½ x 26-in. cylinders and 80-in. drivers, the trailing wheels being 56 in. diam. The grate area is 69.23 sq. ft. and the total heating surface 2,320 sq. ft. The boiler is of the Belpaire type 65⅞ in. diam. and the working pressure is 185 lbs. These engines carry 101,550 lbs. on the drivers, 38,125 lbs. on the forward truck, and 33,775 lbs. on the trailing wheels. The D-16d engine is a new class, having been in service not more than three or four months. It was shown in the *Railroad Gazette* of Aug. 10, page 535, with, however, very little description. It is an eight-wheel engine with cylinders 18½ x 26-in. driving wheels 80 in. in diam. and boiler pressure 185 lbs.

During the summer of 1900, June 30 to Sept. 11, five trains a day were regularly run at a speed exceeding 60 miles an hour, between Camden and Atlantic City, as follows:

No. 256.....	scheduled at	60.3	miles	an	hour,	northward.
No. 257.....	"	63.6	"	"	"	southward.
No. 269.....	"	63.6	"	"	"	"
No. 265.....	"	64.8	"	"	"	"
No. 250.....	"	66.0	"	"	"	northward.

Distance between terminals, 58.3 miles.

Class of Locomotive and Weight of Train.

Train.	Ordinary Weight of Train.	Maximum Weight of Train.
No. 256, Class E-1, No. 698.	898,280 lbs.	1,000,280 lbs.
No. 257, Class D-16d, No. 5.	538,500 "	739,800 "
No. 269, Class E-1, No. 820.	798,280 "	924,880 "
No. 265, Class E-1, No. 698.	734,980 "	1,064,180 "
No. 250, Class D-16d, No. 5.	549,200 "	827,730 "

Train No. 257 made the best record for one month, having arrived at Atlantic City on time each day during July. During this month, the size of the train varied

with the day of the week, and its weight from 485,900 lbs. to 612,500 lbs., depending upon the number and weight of cars used. The actual speed of this train varied from 64.7 miles an hour to 66.0 miles an hour, depending upon time consumed by ferryboat, and at Camden in transferring passengers to the train.

The following are statements of maximum speed maintained for short distances:

June 20.—Train No. 269, Class E-1 engine No. 698, 8 cars, 286 passengers, weight of train (not including passengers), 776,050 lbs. Hammonton to Drawbridge, 27.4 miles, in 20 minutes—82.2 miles an hour.

July 14.—Train No. 265, Class E-1 engine No. 698, 8 cars, 316 passengers, weight of train (not including passengers), 800,480 lbs. Winslow Junction to Drawbridge, 30.6 miles, in 23 minues—79.8 miles an hour.

July 14.—Train No. 257, Class D-16d, engine No. 5, 6 cars, 262 passengers, weight of train (not including passengers), 612,280 lbs. Pomona to Drawbridge, 11.2 miles, in 8 minutes —84 miles an hour.

July 23.—Train No. 256, Class E-1 engine No. 698, 10 cars, 527 passengers, weight of train (not including passengers), 922,330 lbs. Elwood to Haddonfield, 29.6 miles, in 24 minutes—74 miles an hour. Berlin to Haddonfield, 9.7 miles, in 7 minutes—83.1 miles an hour. Lucaston to Haddonfield, 7 miles, in 5 minutes—84 miles an hour.

August 3.—Train No. 257, Class D-16d engine No. 5, 5 cars, 230 passengers, weight of train (not including passengers), 557,800 lbs. Winslow Junction to Egg Harbor, 14.3 miles, in 10½ minutes—81 miles an hour.

August 3.—Train No. 269, Class E-1, engine No. 698, 9 cars, 461 passengers, weight of train (not including passengers), 868,650 lbs. Elwood to Absecon, 15.6 miles, in 11½ minutes —81 miles an hour.

August 6.—Train No. 265, Class E-1 engine No. 698, 7 cars, 268 passengers, weight of train (not including passengers), 738,050 lbs. Ancora to Doughty, 24.4 miles, in 18 minutes—81.3 miles an hour.

August 6.—Train No. 256, Class E-1 engine No. 698, 11 cars, 518 passengers, weight of train (not including passengers), 987,950 lbs. Berlin to Collingswood, 12.2 miles in 9½ minutes —77 miles an hour.

August 7.—Train No. 265, Class E-1 engine No. 820, 7 cars, 264 passengers, weight of train (not including passengers), 735,050 lbs. Winslow Junction to Doughty, 22.1 miles, in 16 minutes—82.8 miles an hour.

August 11.—Train No. 265, Class E-1 engine No. 698, 12 cars, 500 passengers, weight of train (not including passengers), 1,049,550 lbs. Collingswood to Drawbridge, 53.4 miles, in 49 minutes—65.3 miles an hour. Hammonton to Drawbridge, 27.4 miles, in 23 minutes—71.4 miles an hour.

August 15.—Train No. 250, Class D-16d engine No. 5, 5 cars, 185 passengers, weight of train (not including passengers), 573,000 lbs. Lucaston to Haddonfield, 7 miles, in 4½ minutes —93 miles an hour. (Same train made same speed between same points Aug. 7.)

August 20.—Train No. 256, Class E-1 engine No. 698, 11 cars, 546 passengers, weight of train (not including passengers), 984,850 lbs. Lucaston to Collingswood, 9.5 miles, in 6½ minutes—87 miles an hour.

September 4.—Train 269, Class E-1 engine No. 698, 7 cars, 236 passengers, weight of train (not including passengers), 734,080 lbs. Winslow Junction to Drawbridge, 30.6 miles, in 22 minutes—83.4 miles an hour.

September 4.—Train No. 256, Class E-1 engine No. 698, 9 cars, 316 passengers, weight of train (not including passengers), 854,950 lbs. Berlin to West Haddonfield, 10.3 miles, in 7 minutes—88.2 miles an hour.

September 11.—Train No. 269, Class E-1 engine No. 698, 7 cars, 221 passengers, weight of train (not including passengers), 734,450 lbs. Hammonton to Absecon, 21.7 miles, in 16 minutes—81.3 miles an hour.

September 18.—Train No. 635, Class D-16d engine No. 5, 6 cars, 77 passengers, weight of train (not including passengers), 649,150 lbs. West Haddonfield to Atlantic City, 52.5 miles, in 45 minutes—70 miles an hour. Atco to Absecon, 39.19 miles, in 27 minutes—73.1 miles an hour.

The Reading's Fastest Trains.

We give herewith a table showing the daily runs of the 60-minute trains of the Atlantic City Railroad (Philadelphia & Reading) during the season just closed. An inspection of these tables will show that the wonderful past performance of these four trains has been maintained this year. It will be seen that the run has been frequently made at a sustained speed from start to stop of over 70 miles an hour. In one case we find that a four-car train made the run at the rate of 75.2 miles per hour, and in another case a five-car train made the same average speed. These trains consist of long vestibule coaches especially designed for the service. The weights of the cars are as below:

Style of car.	Weight.	Seating capacity.
70-ft. coach	92,000 lbs.	90
70-ft. combination	89,900 lbs.	64
Pullman wide vestibule	90,000 lbs.	37

It would be interesting to know the highest speeds touched by these trains and maintained for a few miles, but the management has not attempted to make any record of these.

The engines hauling these trains are Atlantic type four-cylinder compounds built in May, 1900, Class P 3-a. The weights and most important particulars are as below:

Weight on drivers	89,200 lbs.
" truck wheels	46,500 lbs.
" trailers	37,900 lbs.
" total	173,600 lbs.
Heating surface, fire-box	165 sq. ft.
" combustion chamber	54 sq. ft.
" tubes	2,331 sq. ft.
" total	2,550 sq. ft.
Grate area	80.75 sq. ft.
Drivers, diameter	84¼ in.
" material of centers	Cast steel
Truck wheels, diameter	36 in.

TIME SCHEDULE OF SUMMER TRAINS BETWEEN PHILADELPHIA AND ATLANTIC CITY—ATLANTIC CITY RAILWAY (PHILADELPHIA AND READING).

Train No. 21. *Schedule time* 5:09 *P. M. Start to Stop* 51 *minutes.* 55½ *miles.*

JULY.

	2.	3.	4.	5.	6.	7.	9.	10.	11.	12.	13.	14.	16.	17.	18.	19.	20.	21.	23.	24.	25.	26.	27.	28.	30.	31.
Camden Time	5.10¾	5.11½	5.10	5.11	5.10¾	5.10	5.09	5.09¼	5.09	5.09¼	5.10	5.09	5.11	5.10½	5.10¾	5.11	5.11	5.10	5.09¼	5.09	5.09	5.09½	5.09¼	5.09½	5.10	5.10½
Atlantic City Time	6.00	6.01½	5.58	6.05	5.58½	5.59	6.00	5.58½	5.58	5.57	6.00	5.57	5.59	6.04	6.06½	5.58	5.59	5.59	5.57	5.57	5.58	5.57½	5.57½	5.59	5.59	5.57
Elapsed Time—Minutes	49¼	50	48	54	47¾	49	51	49¼	49	47¾	50	48	48	53½	55¼	47	48	49	47¾	48	49	48	48¼	49¼	49	46½
Miles per Hour	67.6	66.6	69.4	61.6	69.7	67.9	65.3	67.6	67.9	69.7	68.6	69.4	69.4	62.2	59.9	70.8	69.4	67.9	69.7	69.4	67.9	69.4	69	67.3	67.9	71.6
Number of Cars	5	6	5	6	5	6	5	5	5	5	6	6	5	5	5	5	5	6	5	5	5	5	5	6	5	5
Passengers Carried	352	528	20	296	328	242	384	355	307	328	385	262	363	323	326	342	338	247	337	335	347	350	395	287	378	336

DELAYS: 3d, one and one-half minutes account waiting for boat; 5th, five minutes waiting for boat; 17th, waiting for boat; 18, waiting for boat.

AUGUST.

	1.	2.	3.	4.	6.	7.	8.	9.	10.	11.	13.	14.	15.	16.	17.	18.	20.	21.	22.	23.	24.	25.	27.	28.	29.	30.	31.
Camden Time	5.10½	5 10¾	5.11¼	5.11	5.09¾	5.09½	5.09¼	5.10	5.09¼	5.10½	5.09¾	5.10½	5.10½	5.10½	5 11	5.12	5.09½	5.09½	5.09¼	5.09½	5.09½	5.09¼	5.10	5.10	5.10	5.11	5.10¾
Atlantic City Time	5.56½	5.58¼	6.00	6.00	5.58	5 58	5.59½	5.59	5.58½	6 02	6.00	5.59	6.00	5.57	6.01	6.02½	6.01	6.03½	6.02½	5.59½	5.58½	5.58½	5.58	5 59	6.00	6.00	5.59½
Elapsed Time—Minutes	46	47½	48¾	49	48¼	48½	50¼	49	49¼	51½	50¼	48½	49½	46½	50	49½	51½	54	53¼	50	49	49¼	49	49	50	49	48¾
Miles per Hour	724	70.1	68 3	67.9	69	68.7	66.2	67.9	67.6	64.6	66.2	68.7	67.3	71.6	66.6	67.3	64.6	61.6	62.5	66.6	67.9	67.6	67.9	67.9	66.6	67.9	68.3
Number of Cars	5	5	6	6	6	6	6	6	6	6	6	6	6	5	6	6	6	6	6	6	6	6	6	6	6	6	6
Passengers Carried	384	398	509	350	442	384	382	424	463	412	429	386	396	367	442	347	386	410	358	502	422	306	366	311	345	265	328

DELAYS: 11th, waiting for boat and delayed at crossing; 17th, waiting for boat and delayed at crossing; 18th, waiting for boat and delayed at crossing; 21st, delayed at crossing; 22d, delayed at crossing.

SEPTEMBER.

	1.	3.	4.	5.	6.	7.	8.	10.	11.	12.	13.	14.	15.
Camden Time	5.11	5.12¼	5.10½	5.10	5.09¾	5.10¼	5.10¼	5.10	5.10¼	5.10¼	5.12½	5.11½	5.11½
Atlantic City Time	6.00	5.59½	6.02	5.58	5.58	6 07	6.01	6.01½	5.58	5.56½	6.00	5.59	6.11½
Elapsed Time—Minutes	49	47¼	51½	48	48¼	56¾	50¾	51½	47¾	46¼	47½	47½	60
Miles per Hour	67.9	70.5	64.6	69.4	69	56.8	65.6	64.6	69.7	72	70.1	70.1	55 5
Number of Cars	6	5	5	5	5	5	6	5	5	5	5	5	5
Passengers Carried	282	83	225	239	205	232	140	208	200	210	196	245	158

DELAYS: 4th, extra stop; 7th, waiting for boat; 8th, delayed at crossing; 10th, delayed at crossing; 15th, disabled train ahead.

Train No. 25. *Schedule time* 3:49 *P. M. Start to Stop* 51 *minutes.* 55½ *miles.*

JULY.

	2.	3.	4.	5.	6.	7.	9.	10.	11.	12.	13.	14.	16.	17.	18.	19.	20.	21.	23.	24.	25.	26.	27.	28.	30.	31.
Camden Time	3.51	3.51½	3.50¾	3.52¾	3.49¾	3.50½	3.50	3.50	3.50¼	3.50	3.50¾	3.51½	3.52½	3.53	3.51	3.51½	3.51½	3.50¼	3.50½	3.50¼	3.50½	3.49¾	3.50¾	3.51½	3.51¼	3.51½
Atlantic City Time	4.36½	4.39	4.35	4.38	4.35¾	4.40	4.37	4.36½	4.37	4.36½	4.37½	4.38	4.39	4.40	4.43	4.39½	4.40	4.40	4.39	4.40	4.40	4.38	4.38	4.39	4.38½	4.38½
Elapsed Time—Minutes	45½	47¼	44¼	45¼	46	49½	47	46½	46¾	46½	46¾	46½	46½	47	52	48	49¼	49¾	48½	49¾	49½	48¼	47¼	47½	47¼	47
Miles per Hour	73.1	70.5	75.2	73.5	72.4	67.3	70.8	71.6	71.2	71.6	71.2	71.6	71.6	70.8	64	69.4	67.6	66.9	68.7	66.9	67.3	69	70.5	70.1	70.5	70.8
Number of Cars	4	5	4	4	4	6	4	4	4	4	5	6	5	5	5	5	5	6	5	5	5	5	5	6	5	5
Passengers Carried	124	279	25	177	197	329	178	166	173	197	187	385	254	262	176	228	258	456	193	225	276	190	239	514	174	208

DELAYS: 18th, waiting for boat.

AUGUST.

	1.	2.	3.	4.	6.	7.	8.	9.	10.	11.	13.	14.	15.	16.	17.	18.	20.	21.	22.	23.	24.	25	27.	28.	29.	30.	31.
Camden Time	3.52½	3.51½	3.51½	3.52	3.49¾	3.50	3.50¾	3.51	3.50¼	3.50¼	3.51¾	3.51½	3.52	3.52¾	3.52	3.51¾	3.50	3.49¾	3.50¼	3.51	3.50	3.50½	3.51¼	3.51	3.51¾	3.52	3.51¾
Atlantic City Time	4.3-¼	4.38½	4.39	4.40	4.42	4.36	4 43	4.37¼	4.37	4.45½	4.39	4.38½	4.39	4.37	4.40	4.45	4.37	4 37½	4.40	4.40	4.40¾	4.38½	4.38	4 41	4.39½	4.38½	4.39
Elapsed Time—Minutes	45¾	47	47½	48	52¼	46	52¼	46¼	46¾	55¼	47¼	47	47	44¼	48	53¼	47	47¾	49¾	49	50¾	48	46¾	50	47¾	46½	47¼
Miles per Hour	72.8	70.8	70.1	69.4	63	72.4	63.7	72	71.2	60.2	70.5	70.8	70.8	75.2	69.4	62.5	70.8	69.7	66.9	67.9	65.6	69.4	71.2	66.6	69.7	71.6	70 5
Number of Cars	5	5	5	6	5	5	5	5	6	6	5	5	5	5	6	6	5	5	5	5	6	6	5	5	6	5	6
Passengers Carried	276	226	350	505	265	278	296	369	454	619	328	302	332	345	389	618	277	226	243	253	333	465	272	267	241	230	295

DELAYS: 6th, low in steam; 8th, signal failure; 11th, signal failure; 18th, signal failure, waiting for boat; 28th, delayed at crossing.

SEPTEMBER.

	1.	3.	4.	5.	6.	7.	8.	10.
Camden Time	3.52	3.51¾	3.49¾	3.51¾	3.50¾	3.50	3.50½	3.51
Atlantic City Time	4.42	4.39⅛	4.37⅞	4.38	4.38	4.38	4.40	4.40
Elapsed Time—Minutes	50	47¾	47¾	46¼	47¼	48	49½	49
Miles per Hour	66.6	69.7	69.7	72	70.5	69.4	67.3	67.9
Number of Cars	6	5	5	5	5	5	6	5
Passengers Carried	503	92	130	162	114	140	225	115

DELAYS: 1st, delayed at crossing.

Trailing wheels, diameter	54¼ in.
Journals, driving axle, main	9 in. x 12 in.
" driving axle, front	8½ in. x 12 in.
" truck axle	6 in. x 12 in.
" trailing axle	8½ in. x 12 in.
Main crank pin	6½ in. x 6½ in.
Side rod pins	7 in. x 4½ in. main, 5¾ in. x 5 in. front
Crosshead pins	4 in. x 4 in.
Cylinders, diameter H.P.	15 in.
" " L.P.	25 in.
Piston, stroke	24 in.
Piston rod, diameter	4½ in.
Main rod, length center to center	11 ft. 3¼ in.
Steam ports, length	18 in.
" width	1½ in.
Exhaust ports, length	18 in.
" width	4½ in.
Valves	Piston
" greatest travel	5⅜ in.
" outside lap H.P.	⅞ in.
" outside lap, L.P.	⅝ in.
" inside clearance H.P.	⅛ in.
" inside clearance, L.P.	¼ in.
" lead	Variable
Boiler	Wootten
" working, steam pressure	200 lbs.
" diameter of barrel at front sheet	58¾ in.
Crown sheet stayed with	Radial stays and crown bars
Tubes, number	377
" material	Iron
" outside diameter	1¾ in.
" length over sheets	13 ft. 7 in.
Fire-box length	9 ft. 6 in.
" width	8 ft. 6 in.
" depth, front	53½ in.
" " back	53½ in.
" brick	Wall at front of furnace
" water space, width, sides	3½ in.
" " " back	3½ in.
Grate	Water tubes with cast-iron bars and 4 drop grates
Smoke-box, diameter	62¼ in.
" length, from tube sheet to end	38 in.
Exhaust nozzle	Double fixed
" " diameters	3½ and 4 in.
Tank capacity for water	5,950 gals.
Coal capacity	8 tons

International Association for Testing Materials—American Section.

The third annual meeting of the American Section of the International Association for Testing Materials was held in the house of the American Society of Mechanical Engineers in New York, Oct. 25, 26 and 27. The first session was devoted to routine business and the election of officers for the ensuing year. The Secretary's report showed that there were 142 members qualified to vote, 90 of whom voted. The following officers were unanimously elected:

Chairman, Prof. Henry M. Howe; Vice-Chairman, Dr. Charles P. Dudley; Secretary, Prof. J. M. Porter; Treasurer, Robert W. Lesley; American Member of Council, Prof. Henry M. Howe.

In the address of Prof. Mansfield Merriman, the retiring President, he called attention to the fact that at the recent Paris Congress six of the 40 papers there presented were by American engineers; this being a larger number than from any other one country, except France. Regarding the especial work of the International Association, he stated, that the proceedings of the International Council had never been published nor had any statement of the expenditures of the Council been made public, so that while the American members have regularly paid into the general association the full required annual dues of $1.50 each, they had no knowledge of what course was being pursued by the Council nor of what expenditures had been incurred by it. He recommended a change in the manner of selection of the members of the International Council, suggesting that these members be each elected by a majority of the members in the country they were to represent in the Council, or preferably still for the American Section, that the Chairman of the Section be ex-officio member of the International Council. He also deemed it essential to the success of the Association that the proceedings of the Council be published for the information of all members. He favored the holding of international congresses, the expenses of which should be assessed upon all members.

The report of the Treasurer showed that the total receipts of the American Section for the year had been $1,223.13, which included $705 of voluntary contributions to the special publication and research fund. The expenses of the publication of the bulletins Nos. 8 to 18, inclusive, being the bulletins containing the specifications recommended by the American branch of Committee No. 1, had been very heavy and would have been practically impossible to meet but for the generous contributions made to the publication fund. The largest single contribution to this fund being from the *Railroad Gazette*, which gave $200 towards the expense of printing.

In the report of the Executive Committee regarding the representation of the American Section on the International Council, presented by the Chairman, Prof. Merriman, it was stated that the provisional appointment last summer of Prof. Henry M. Howe as American Member of Council was taken in accordance with the request of President Tetmajer in his letters of Feb. 19 and March 14. The action of the Executive Committee in ordering a ballot at this time for this same office was also at the request of President Tetmeyer as stated in his letter of July 23.

As the International Council had not approved of the increase of the American Branch of Committee No. 1 from five to 34 members the following resolutions were adopted by the meeting:

That the American Section records its hearty concurrence in the action of the International Council as expressed in the letter of President Tetmajer, which has limited the American membership of Committee No. 1 to five persons.

That in the deliberative work and recommendations of Committee No. 1 of the American Section the 34 members already taking part have equal votes, the majority action of this number constituting the official action of the Committee.

General Discussion of All Specifications.

The evening session of Oct. 25, according to the programme, was to be devoted to the discussion of the proposed specifications for steel for buildings, bridges, ships, boiler plate and rivets as published in bulletins 8, 9 and 10. Owing to lack of system in handling this discussion, the time was not well used and although the session was prolonged late into the night and more or less valuable criticism offered it was not so formulated as to readily assist in the work of the meeting. It is hoped that from the mass of opinions expressed the Committee can derive some desirable advice and be aided in amending the pub-

TIME SCHEDULE OF SUMMER TRAINS BETWEEN PHILADELPHIA AND ATLANTIC CITY—ATLANTIC CITY RAILWAY (PHILADELPHIA AND READING).

Train No. 24. Schedule time 8:00 A. M. Start to Stop 50 minutes. 55½ miles.

JULY.

	2.	3.	4.	5.	6.	7.	9.	10.	11.	12.	13.	14.	16.	17.	18.	19.	20.	21.	23.	24.	25.	26.	27.	28.	30.	31.
Atlantic City Time	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.01	8.00	8.00	8.00	8.00	8.00	8.01½	8.00	8.00	8.00	8.00	8.00
Camden Time	8.48	8.48	8.50	8.50	8 48½	8.50	8.50	8.50	8.50	8.49	8.50	8.50	8.50	8.58	8.51	8 50	8.50	8.50	8 50¾	8.50	8.51½	8.50	8.50	8.50	8.50	8.53¾
Elapsed Time—Minutes	48	48	50	50	48½	50	50	50	50	49	50	50	50	58	50	50	50	50	50¾	50	50	50	50	50	50	53¾
Miles per Hour	69.4	69 4	66.6	66.6	68.7	66.6	66.6	66.6	66.6	67.9	6.66	66.6	66.6	57.4	66.6	66 6	66.6	66.6	65.9	66.6	66.6	66.6	66.6	66.6	66.6	62 2
Number of Cars	4	4	4	5	4	4	6	4	4	4	4	5	6	5	5	5	5	5	5	5	5	5	5	5	5	5
Passengers Carried	148	108	6	148	110	65	159	138	132	137	141	70	226	149	136	148	147	80	230	149	158	170	175	77	230	136

DELAYS: 17th, extra stop; 18th, delayed at crossing; 25th, delayed at crossing; 31st, air hose on train burst.

AUGUST.

	1.	2.	3.	4.	6.	7.	8.	9.	10.	11.	13.	14.	15.	16.	17.	18.	20.	21.	22.	23.	24.	25.	27.	28.	29.	30.	31.
Atlantic City Time	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8.00	8 00	8.00	8.00	8.00	8.00	8.00	8.00	8.00
Camden Time	8.50	8.52	8 49½	8.50	8.56½	8.52	8.49½	8.50	8.50	8.50½	8.49¾	8.49	8.49	8.50	8.48¾	8.50	8.51	8.49	8.49½	8 49½	8.49¼	8.50¼	8.50¾	8 49½	8.49	8.49	8.50
Elapsed Time—Minutes	50	52½	49½	50	56½	52	49½	50	50	50½	49¾	49	49	50	48¾	50	51	49	49½	49½	49¼	50¼	50¾	49½	49	49	50
Miles per Hour	66.6	63.4	67.3	66.6	50.1	64	67 3	66.6	66.6	65.9	66 9	67.9	67.9	66.6	68.3	66.6	65.3	67 9	67 3	67.3	67.6	66.2	65.6	67.3	67.9	67.9	66.6
Number of Cars	5	5	5	5	6	5	5	5	5	6	6	5	5	5	5	6	6	5	5	5	5	6	6	5	5	5	5
Passengers Carried	143	186	186	91	267	213	178	179	208	98	276	198	180	185	199	107	294	198	198	169	185	120	258	176	198	187	186

DELAYS: 2nd, delayed at crossing; 6th, train ahead; 7th low in steam; 20th, delayed at crossing; 27th, delayed at crossing.

SEPT.

	1.	3.	4
Atlantic City Time	8.00	8.00	8.00
Camden Time	8.49¾	8.52	8.52¾
Elapsed Time—Minutes	49¾	52	52¾
Miles per Hour	66.9	64	63 1
Number of Cars	5	5	5
Passengers Carried	63	98	164

DELAYS: 3rd, delayed at crossing; 4th, signal failure.

Train No. 26. Schedule time 8:20 A. M. Start to Stop 50 minutes. 55½ miles.

JULY.

	2.	3.	4.	5.	6.	7.	9.	10.	11.	12.	13.	14.	16.	17.	18.	19.	20.	21.	23.	24.	25.	26.	27.	28.	30.	31.
Atlantic City Time	8.21	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8 20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20
Camden Time	9.11½	9.10	9.12	9 13	9.12	9.12	9.14	9.13½	9.10	9.11	9.09¼	9.10½	9 10⅜	9.09	9.10¾	9.10	9.10	9.10	9.10	9.09⅜	9.10½	9.09¼	9.10	9 09½	9.10¼	9.08¼
Elapsed Time—Minutes	50½	50	52	53	52	52	54	53½	50	51	49½	50⅝	50⅛	49	50¼	50	50	50	50	49⅝	50½	49¼	50	49½	50⅝	48⅝
Miles per Hour	65.9	66.6	64	62.8	64	64	61.6	62.2	66.6	65.3	67.3	65.9	65.9	67.9	66.2	66.6	66.6	66.6	66.6	67.3	65.9	67.6	66.6	67.3	65.9	68.7
Number of Cars	5	5	5	6	6	5	6	5	5	5	5	7	6	5	5	5	5	5	6	5	5	5	5	5	6	5
Passengers Carried	194	109	21	235	153	80	253	174	139	151	171	109	280	164	140	167	163	151	323	184	176	179	161	109	308	215

DELAYS: 2d, delayed at crossing; 5th, heavy train and strong head wind; 6th, delayed at crossing; 12th delayed at crossing.

AUGUST.

	1.	2.	3.	4.	6.	7.	8.	9.	10.	11.	13.	14.	15.	16.	17.	18.	20.	21.	22.	23.	24.	25.	27.	28.	29.	30.	31.
Atlantic City Time	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8 20	8.20	8.20
Camden Time	9.09½	9.09	9.10	9.10¼	9.21	9.10	9.10¼	9.10½	9.10¼	9.11	9.10¼	9.10¼	9.09	9.10½	9.09½	9.08¼	9.10⅜	9.10	9.10	9.10	9.10	9.10¼	9.10½	9.10½	9.09¾	9.10½	9.10¼
Elapsed Time—Minutes	49½	49	50	50¼	61	50	50¼	50½	50¼	51	50¼	50¼	49	50½	49½	48¼	50½	50	50	50	50	50¼	49½	50⅜	49¾	50⅛	50¼
Miles per Hour	67.3	67.9	66.6	66.2	54.5	66.6	66.2	65.9	66.2	65.3	66.2	66.2	67.9	65.9	67.3	69.	65.9	66.6	66.6	66.6	66.6	66.2	67.3	65.9	66.9	65.9	66.2
Number of Cars	5	5	5	5	6	6	5	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6
Passengers Carried	206	198	200	132	361	212	191	198	209	133	388	228	196	246	236	137	467	241	204	232	201	98	338	194	196	174	189

DELAYS: 6th, train ahead.

SEPTEMBER.

	1.	3.	4.	5.	6.	7.	8.	10.	11.	12.	13.	14.	15.
Atlantic City Time	8.20	8 20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20	8.20
Camden Time	9.10¼	9.16	9.12¼	9.09½	9.10	9.09½	9.09½	9.11¾	9.10	9.10¼	9.11½	9.09¼	9.09½
Elapsed Time—Minutes	50¼	56	52¼	49½	50	49½	49½	51¾	50	50¼	51½	49¼	49½
Miles per Hour	66.2	59.4	63.7	67.3	66.6	67.3	67.3	64.3	66.6	66.2	64.6	67.6	67.3
Number of Cars	6	6	6	5	5	5	5	6	6	5	5	5	5
Passengers Carried	697	168	239	174	164	200	102	288	154	142	184	177	157

DELAYS: 3rd, train ahead; 4th, signal failure; 13th, signal failure.

lished specifications, so as to better meet the ideas and wishes of American engineers.

The first question raised was with reference to specifying the method of manufacture. Dr. C. B. Dudley, of the Pennsylvania Railroad, said that his road had decided not to specify the method of manufacture in any kind of steel, specifying instead certain chemical and physical requirements which might or might not indirectly exclude certain makes of steel. Mr. McLeod, of the Carnegie Steel Co., stated that the Committee had been governed in the matter by the common practice of most American engineers to specify that steel for bridges, boilers and fireboxes be made by the open-hearth process, while steel for building might be of Bessemer. The idea being to present typical American specifications and therefore, since the general consensus of opinion favored such restrictions the committee did not wish to go contrary to that opinion.

Mr. C. E. Stafford, Manager of the Open Hearth Department of the Illinois Steel Co., stated, as his opinion, that Bessemer steel of the same chemical constituents as open-hearth steel was as good and as reliable a material as the latter, and could be produced as uniformly. He believed that a prejudice has arisen against Bessemer steel because of the fact that as usually made it was a relatively high phosphorus metal and was compared with a low phosphorus open-hearth steel. He stated that for the same content of phosphorus and carbon in acid and basic steel the acid steel would be somewhat the harder of the two.

Mr. Huston, of the Lukens Steel & Iron Co., cited the fact that they had experienced certain failures in the hand flanging of Bessemer steel plates that had caused them to cease to recommend Bessemer steel for such use; he believed open-hearth steel of .08 phosphorus a much safer metal than Bessemer of some phosphorus content.

Mr. Colby, of the Bethlehem Steel Co., said the offered specifications could not be accepted abroad because they would exclude basic Bessemer steel, which is so largely made there.

Mr. Webster, consulting engineer, explained for the Committee that the instructions that Committee had received were to formulate specifications from existing American specifications. The specifications thus prepared were now offered for discussion here, and it is hoped, they will also be discussed in the engineering societies.

Mr. H. H. Campbell, of the Pennsylvania Steel Co., said that he doubted if the engineers could be gotten to discuss any specifications. In his opinion the question of method of manufacture was not a minor one but one of great importance, especially in the case of railroad bridges. It was finally settled by vote that it was the sense of the meeting that it was desirable to specify by what method the steel should be made for several of the specifications.

After a lengthy discussion regarding "elastic limit" and "yield point" a vote was taken to determine if it was the opinion of those present that the "yield point" be determined exclusively by the drop of the beam of the testing machine or by the use of calipers as well, where so desired. The vote was in favor of determining by the drop of the beam. The value of the determination of the yield point, as made in commercial testing, was stated by Mr. T. L. Condron, of the Pittsburgh Testing Laboratory, as having very little value, and he cited two series of forty duplicate tests made on two different testing machines, the first in one of the larger mills, the other in the laboratory of his company bearing out the opinion. Dr. Dudley stated that his company had ceased to specify elastic limit or yield point in their specifications, believing that it was not practicable to determine that property of steel in ordinary testing. Mr. Kruezpointner, of the Pennsylvania Railroad, also discussed this point at length advocating the alternative of allowing the use of dividers to determine when the specimen has reached the yield point and begins to stretch perceptibly to the eye.

The question of specifying the carbon content in boiler plate having been raised, Mr. Condron stated, that in his opinion, it was unreasonable to specify rigid physical requirements for plates and at the same time tie the manufacturers' hands by specifying all the chemical constituents, too. He felt that while it was desirable to place limits on the phosphorus, sulphur and manganese, the carbon should be left unspecified. Dr. Dudley objected strongly to leaving out the specification of carbon which in the Pennsylvania Railroad specifications, requires more than 0.15 and less than 0.25 per cent., with 0.18 per cent. desired. Mr. Huston, of the Lukens Steel & Iron Co., contended that the danger Dr. Dudley feared of having the strength of the steel brought up by high manganese combined with low carbon, is better guarded against by limiting the manganese, as proposed in the specifications.

The entire programme for the evening session being made the order of business for the afternoon session of the second day, the meeting adjourned.

Steel Rails.

The first subject considered at the morning session, Oct 26, was the proposed specifications for steel rails. These specifications provide that the steel may be made by the Bessemer or open-hearth process.

Dr. Dudley raised the question here as to the advisability of specifying process of manufacture.

Mr. Campbell said that the committee had considered it desirable to state in the specifications in general, many things which were probably unnecessary and superfluous in order to satisfy the demands of many engineers. In his opinion these specifications would probably be rejected abroad because of their brevity and simplicity and before they could be made satisfactory to foreign buyers it would be necessary to pad them with much inconsequential detail.

Dr. Dudley's opinion was that because of the great diversity of interests the specifications must be very simple and clear, leaving them to be supplemented by the interested parties in cases of specific contracts, if thought necessary. He also desired to know if these specifications were intended simply as specifications to sell by or should they be so framed as to represent the best thought and largest experience of metallurgists and consumers at this time in this country. He added that the specifications as now drawn are clearly in the interests of the steel makers. Mr. Colby, replying to this statement, said that the foreign engineers he met at the Paris congress and at the British Iron & Steel Institute this summer all claimed that these specifications in general could not be accepted as international specifications because they were too rigid in their requirements and could not be met by many European manufacturers. Regarding the processes of manufacture, Mr. Colby called attention to the fact that all of the specifications had been drawn with an almost uniform arrangement of headings, it having been deemed advisable to follow as nearly as possible this form; hence, in all of the specifications the first heading was "Process of Manufacture," under which the restrictions were made narrow or broad as was deemed most advisable in each case.

The clause reading, "sufficient material shall be discarded from the top of the ingots to insure sound rails," was amended, after a lengthy discussion, by the addition of the words, "free from injurious segregation." In the discussion both Dr. Dudley and Mr. Kruezpointner cited cases of serious failures due to segregation in steel, and in their opinion this was at the same time the most serious danger to be guarded against, and probably the most difficult problem to be met in steel making.

Regarding the varying percentages of carbon for different weight sections provided for in the specifications, Mr. McLeod gave it as his opinion that there would be no reason for varying the carbon if the same heat treatment and like amount of work was done on all different sections.

Dr. Dudley believed that the increase of carbon with increase of section was wrong in principle. It encouraged the practice of finishing larger sections at a higher heat which he considered undesirable from the standpoint of the consumer, although of distinct advantage to the manufacturer. By lowering the carbon in the larger sections these rails would be finished at more nearly the heat of recalescence.

Mar. Carhart, of the Illinois Steel Co., stated that the experience of his company pointed to the opposite conclusion. He said that some years ago when it had been decided to tear out and rebuild one of their rail mills, permission had been given to Mr. Delano, of the Chicago, Burlington & Quincy to carry out a series of experiments with the cold rolling of rails, the company being willing to permit the destruction of rolls and housings if that resulted. In these experimental rollings, rails were finished at temperatures varying from the normal finishing heat to black heat. Mr. Carhart understands that Mr. Delano has failed to find, after ten years' service of these rails, any evidence that the cold rolling had resulted in any benefit to the wearing qualities of the rails made. He suggested that Committee No. 1 communicate with Mr. Delano regarding this matter with the view to obtaining what information could be had on the subject. In the opinion of the manufacturers present it was commercially impossible to finish rails at the heat of recalescence. It was the sense of the meeting that the specifications should remain as they were with reference to carbon in rails.

The subject of the drop test was discussed by several members and the desirability of specifying and measuring the deflection of the rail under this test was advocated by Prof. Merriman, Mr. Wille and others.

Prof. Merriman considered that there should be some measure of the ductility of rail steel as well as the strength to resist blows.

Mr. Colby contended that it would be impracticable to include in a specification requirements for carbon and at the same time limit the deflection under drop test. In his opinion the drop test without determination of deflection when the carbon was specified made a wiser and safer specification than one which did not limit the carbon but included a required deflection under drop test. The difficulty which would attend any correct determination of the deflection in the case of drop tests would seem to make such a specification undesirable.

No recommendation for changing this clause was adopted but the subject was referred back to the committee with instructions to further consider the expediency of providing for a measure of the deflection under the drop test.

Regarding the chemical analyses of steel for rails, Dr. Dudley considered it infinitely better to take borings from the finished product for analysis than from a test ingot, known as the ladle test.

Mr. Campbell did not agree with Dr. Dudley, claiming that the ladle analysis was a better and surer way of determining the composition of the mass of a heat of steel and an analysis of the drillings from any one rail would only determine the composition of that particular place in that one rail, and would generally be very misleading. Moreover, it was to be borne in mind that mill practice in this country to-day was such that a product of 2,000 tons of finished rails were turned out in 24 hours and the chemical determinations had to precede the rolling or a mill would be blocked awaiting such analyses before the end of one day. It was commercially impossible to hold rails back awaiting the results of chemical analyses of finished product.

Mr. Carhart stated that it was the practice of his company to make all drop tests upon the rail ends corresponding to the tops of the ingots and this gave an excellent check upon the possible segregation Dr. Dudley wished so much to guard against by analysis from the finished product.

Mr. Condron considered this a point worth careful consideration by the committee and it might be wise to require it in the specification.

Dr. Dudley stated that the Pennsylvania Railroad was beginning to introduce a clause in its specifications providing that when material did not fully meet with the requirements, but was still considered safe to use, its acceptance be made the subject of adjudication and reduction of remuneration. They were relying upon the financial interests of the manufacturer insuring the delivery of highest grade of material.

This ended the discussion of the rail specifications.

Steel Splice Bars.

The only criticism on the specifications proposed for splice bars was upon the low carbon steel recommended. Upon this point Dr. Dudley called attention to the familiar fact that where splice bars fail they usually break from the top down, indicating that the bars are subjected to greater tensile stress in the upper fibers than in the lower. These failures lead to a careful investigation of the stresses induced in splice bars by the wheel loads passing over them. As would be readily appreciated the stresses were difficult to determine accurately, but the results of the calculations made by their engineers would indicate that where the joint in the rails came between two ties the position of wheel load for maximum stress in the splice bar, would be on the unsupported portion of the rail between the next two ties. This position of load would tend to lift the end of the rail, the intermediate tie acting as a fulcrum. The splice bar, in resisting this motion of the rail would be so stressed as to produce tension in the head of the bar, exceeding 30,000 lbs. per sq. in. Moreover the bar is constantly subjected to reversal of stress and it is therefore surprising that there are not more failures than are found. Owing to the many conditions which tend to complicate the analysis of the stresses in these bars, and the assumptions which it is necessary to make the calculations referred to should not be accepted further than as indicative of the possible conditions. Dr. Dudley was therefore in favor of using a higher carbon steel for splice bars because such steel had proven to be better adapted for resisting reversals of stresses. The objections to higher carbon steel for this use were pointed out by others present who referred to the fact that these bars are punched and not drilled and that hard steel would tend to cut into the heads of the rails. As no pronounced objection was raised to the proposed specifications, no recommendation of change was made by the meeting.

Structural Steel for Buildings.

At the afternoon session, Oct. 26, a number of reports of standing committees were called for but none of these committees were prepared to report.

The programme for the second session which had been carried over to this session was then taken up, and the first specifications considered were those for structural steel for buildings. The first criticism raised, was upon the high limits fixed for minimum yield points in both of the classes of steel, that is 30,000 lbs. per sq. in. for rivet, and 35,000 lbs. for medium steel.

Mr. Stafford offered an amendment changing the wording of the requirement for minimum yield point so that it should read one-half of the ultimate tensile strength in either class of steel.

Mr. McLeod considered such a change uncalled for and undesirable. He said that the Carnegie Steel Co. had no difficulty in making steel that would meet the higher requirements for yield point proposed, as it was agreed that this point was to be determined by the observation of the drop of the beam or the halt in the gage of the testing machine. He assured those present that they might satisfy themselves on this point at any time by observing the behavior of specimens being tested on their testing machines.

Mr. Condron raised the point that there was frequently more than a single drop of the beam as the load approached the critical yield point and no amount of argument would decide that a drop, before the specified load was reached was the one to be recorded as the critical drop.

Mr. Stafford's proposed amendment was accepted as the sense of the meeting, changing the requirement for yield point to one-half the ultimate tensile strength.

An amendment was likewise adopted providing that the sheared edges of bending test specimens may be planed or milled. Also an amendment to the paragraph regarding test specimens from material that is to be annealed. The clause in the proposed specification reads: "For material which is to be annealed or otherwise treated before use, a full-sized section of tensile specimen length, shall be similarly treated before cutting the tensile test specimen therefrom." To this clause was added the words: "where impracticable to cut a test specimen from the finished piece."

Mr. Stafford recommended that under the clause regarding the overweight of material ordered by gage, that it be clearly stated that a variation of as much as one

one-hundredth of an inch under specified gage be allowed. This recommendation was adopted.

The above three amendments were likewise adopted for the specifications for Structural Steel for Bridges and Ships and those for Boiler and Fire-box Plates.

Structural Steel for Bridges and Ships.

These specifications were next considered and were amended as stated above. During the discussion of these specifications the letter from Mr. R. S. Buck, Chief Engineer of Bridges Nos. 3 and 4, New York City, printed in full in Bulletin No. 20 of the Association, was read and an opportunity given to those present to answer, if they so desired, the several questions raised therein.

Regarding the question of the relative merits of acid and basic open-hearth steel, Mr. Campbell gave it as his personal opinion that acid steel was superior to basic steel. He did not qualify his opinion by saying whether he meant it to refer to the two steels of the same chemical composition or not.

Mr. Webster was confident that equally reliable steel of the high tensile strength desired, 70,000 to 80,000 lbs., could be made by either the acid or basic process.

Mr. Stafford agreed with Mr. Webster, but stated that this higher tensile steel would require more careful attention and treatment in the shops than was necessary with lower tensile. He would recommend that a great many bending tests be required for such material.

Mr. Campbell called attention to the fact that it was necessary to run the carbon several points higher in acid than in basic steel for the same tensile strength; he also would have more fear of segregation of carbon in the higher grade of steel proposed.

Mr. McLeod was unqualifiedly in favor of basic steel. His company makes only that kind of open-hearth steel and during recent years has made many thousands of tons of axles having tensile strengths varying between 75,000 and 85,000 lbs. without having had a single failure reported.

Mr. Huston said that his company always preferred to make heavy marine boiler plate of high tensile strength by the basic process, believing they were safer in doing so.

Mr. Stafford said it was his practice to do the same, except where acid steel was specifically called for.

Dr. Dudley said that he had formerly been a strong advocate of the use of soft steel, but that his observations and experiences had changed his views regarding the matter, and that he now feels satisfied that a higher carbon steel is desirable for uses where formerly he recommended only soft steel. The Pennsylvania Railroad is now putting axles in service having carbon as high as .55 per cent. For uses where the metal is subjected to frequent reversals of stress he considers that higher carbon steels would give better and safer results. It was necessary to bear in mind that as you raise the carbon it becomes of increasing importance to exercise greater care with reference to the other constituents of the steel.

Mr. Buck inquired if it would be necessary to allow higher limits of phosphorus for 70,000 to 80,000 lbs. steel.

Mr. McLeod said that a limit of .04 for phosphorus would cause no hardship in the case of basic steel.

Mr. Campbell stated that it was merely for commercial reasons that acid steel of .08 phosphorus was compared with basic steel of .04 phosphorus, it being a fact that these differences in the phosphorus made the two makes of steel comparable as to cost of manufacture.

Dr. Dudley said it had long surprised him that engineers should place different limits for phosphorus in their specifications for acid and basic steel, as if acid steel of a given phosphorus was as good a material as basic steel of lower phosphorus.

In the discussion bearing directly upon the specifications proposed by the committee the objections raised to the overlapping of the limits for tensile strength provided for "soft" and "medium" steel were considered. Attention was called to the fact that while it had been customary in most of the existing specifications to permit ranges in tensile strength of but 8,000 lbs. the committee had decided after careful consideration to extend these limits to 10,000 lbs. in each case. They had accordingly given to soft steel the range, from 52,000 to 62,000 lbs. per sq. in. tensile strength, and to medium steel the range from 60,000 to 70,000 lbs. These limits were intended to cover all the different sizes and shapes as well as thicknesses of the steel coming under the specifications, it not being deemed desirable to allow variations in tensile strength for thin and thick material.

Mr. Condron said that he believed few engineers would raise any objection to the upper limit of 70,000 lbs., provided they felt assured that none of the material going into their structure would have a higher tensile strength, and correspondingly less ductility than would be found in steel of 70,000 lbs. ultimate strength, but the facts were that the tests made can never represent all of the material intended to be covered by the tests. The usual specifications require single tensile tests from each heat of steel. So long as this test fulfils the requirements of the specifications, and the bend tests are successful, the entire heat of steel is considered acceptable for the class of material and gage represented by one test. This raises the question as to how much variation in physical properties would be found in material of the same gage made from one heat of steel. He considered fully 6,000 or 8,000 lbs. range of tensile strength must be expected, and, in extreme cases, 8,000 or 10,000 lbs. That is, a test from material from near the bottom of an ingot and finished hot, showing the low tensile strength, and another test of steel from near the top of an ingot, and finished cold, would probably give results differing as much as 6,000 or 8,000 lbs. in tensile strength. If the one test considered approached near to either the upper or lower limit some of the steel would probably be as much as 5,000 lbs. or more, either above or below the limits of the specification. As it is manifestly impossible to determine by the tests made the physical properties of all of the steel used, the range of tensile strength should be quite limited for the usual heat tests, and he, therefore, favored the narrower limit of 8,000 lbs. for regular tests, where only one or two tests per heat are required, placing the upper limit for medium steel at 68,000 lbs. instead of 70,000 lbs. He further recommended that where the first test gave results not more than 3,000 lbs. outside of the limits prescribed, one or two additional tests, selected by the inspector, be permitted and if the average of the two or three tests fell within the narrower specifications the material should be accepted, otherwise it should be rejected.

There was but little discussion upon the remaining paragraphs of the specifications, and the only modifications recommended in the specifications as proposed by the committee were those embodied in the three amendments referred to above as adopted by the meeting.

Boiler Plate and Rivet Steel.

The first feature of these specifications taken up was the low tensile strength called for for fire-box steel. Dr. Dudley stated that owing to the trouble his company had experienced in the use of soft steel for fire-boxes owing to the abrasive wear by the coal and the giving out of the threads in staybolt holes they had adopted for their fire-boxes steel of 55,000 to 65,000 lbs. tensile strength; the carbon being more than 0.15 and not exceeding 0.25 per cent. This brought up again the question of specifying both tensile strength and carbon, which had been so fully discussed the day before. Dr. Dudley stated that they felt warranted in specifying the carbon as it is their regular practice to make complete chemical and physical tests of all the steel in service on their road that fails or shows undue signs of wear. In reply to a question from Mr. Campbell he said that the probably made twenty or thirty complete analyses and tests each month. Mr. Campbell stated that in his mill more than that many complete sets of chemical and physical tests were made each day and had been for many years. Both the chemical and physical tests were made daily under conditions as unvarying as it was possible to have them. He did not think that it was at all proper that general specifications which were intended to apply to all thicknesses of plates should include limits to the carbon as well as to the physical properties.

Mr. Condron criticised the phosphorus limits, stating that they were unreasonably high for basic open hearth steel, they being given as .06 for flange and .04 for fire-box and rivets.

Mr. Huston proposed that the specifications be amended so as to require that different limits of phosphorus be required for acid than for basic steel. His motion was to require for flange steel, acid .06, basic .04, and for fire-box and rivet steel, acid .04, basic .03. This amendment was adopted.

The same amendments regarding yield point, bending test specimens, and gage, were also adopted for these specifications as had been previously adopted for structural steel. Otherwise the specifications were approved.

The total attendance was about 26; of these six were manufacturers and 18 were engineers not engaged in manufacture.

Liquid Fuel for Locomotives.

[Up to the present time we have kept our readers informed of what Mr. James Holden, Locomotive Superintendent of the Great Eastern Railway of England, has done in the use of liquid fuel for locomotives and have described his apparatus pretty fully, with illustrations. Below we give some extracts from a paper which he presented at the recent International Railway Congress in Paris on this subject, omitting the illustrations.]

So far as its calorific value is concerned, hydrogen is doubtless the ideal fuel, but apart from the impossibility of producing it on a reasonable commercial basis, there are many practical difficulties to overcome in its storage and application for the purposes of steam generation. Coal can by no means be considered an ideal fuel owing mainly to its solid formation, and the fact that its smoke and gases are given off in spasmodic irregular quantities. A large proportion of the gases freed during the decomposition of the coal under the influence of the furnace heat passes away in the form of smoke and escapes unconsumed. This arises from the difficulty of regulating the supply of atmospheric air so as to form an admixture suitable to the ever-varying conditions in the furnace. Having this in mind, the writer some years ago turned his attention to the possibilities of liquid fuel in locomotives in countries where coal had hitherto been the principal fuel. . . . It had always to be borne in mind that the supply of liquid fuel might fail at any moment, or that if engines were fitted for the burning of liquid fuel only the market might be unduly inflated. This made it a primary consideration that the engines should be equally adapted for solid fuel or a combination of solid and liquid fuel.

The burners were therefore designed to spray the liquid fuel above the level of the coal fire, and to introduce air for combustion at such a point that to all intents and purposes the resultant fire should be distinct and separate from the lower solid base. The correct form of burner to secure the best results under these conditions has only been arrived at after very considerable experience, and in this connection it may be stated that, with locomotives especially, the simpler the construction and the less refinement in the fittings, the better the working in actual service.

On the first locomotive boiler to which liquid fuel was applied one, two, three and four burners were successively tried. It was found, however, that two burners placed at the front or fire-hole end of the fire-box gave the best result, and it has therefore been customary to fit two burners on all locomotives having fire-boxes of the width usual on the standard gage, whilst on those for narrower gages one only has often been successfully used. A multiplicity of burners increases liability to derangement and failure, complicates the fittings and pipes, and is almost sure to consume more steam. The regulation of the oil fuel, when only a small quantity is being burnt, is found to be troublesome; in other words, it is easier to regulate one or two burners at a moderate consumption than a greater number at a smaller consumption each. . . .

The result of the early experiments showed that for the successful burning of liquid fuel it was necessary to atomize the liquid fuel and to supply every atom with a sufficient quantity of oxygen for its own perfect combustion, and that to attain this end the supply of air, steam and liquid fuel must each be regulable.

The oil fuel is injected through the front nozzles in a semi-sprayed condition by the steam admitted from a cock of the steam fitting. The jet supplied by this is of annular formation and induces hot air through the interior from the heaters in the smoke-box. To complete the atomizing of the fuel, the steam issues from a series of fine jets arranged round a hollow ring just behind the nozzle. These jets induce a considerable volume of atmospheric air (according to the velocity of steam permitted to pass the regulating cock) and, being directed at angles, deliver the atomized fuel equally over the grate area.

The most desirable position of the burners as already mentioned could only be arrived at by long continued experiments, and so far the best results have been obtained as shown, with the burner eccentric to the holes in the fire-box. This setting of the burners conduces to economy in steam at the ring blower jets, as it utilizes the steam to its utmost for air induction. The ring blower attached to the burner is arranged eccentrically to the nozzle. The brick arch usually provided on coal-burning engines has been retained to obviate the too direct passage of the products of combustion to the tubes and to ensure a thorough combination. Also, the fire-door is provided with a deflector to direct downwards into the center of the fire any air admitted at the fire-door, this practice being common to coal and oil burning engines. It will thus be seen that all the features necessary to the successful burning of solid fuel are retained.

The writer has given considerable attention to the action of the steam used for spraying the fuel and, of course, introduced with it into the fire-box. Very extravagant claims have been made that this injected steam besides serving all its natural mechanical functions as a spraying and distributing agent, also becomes itself an auxiliary source of heat; the explanation offered being that, when the steam comes into contact with the intensely heated fuel in the fire-box, it is decomposed into its component elements, hydrogen and oxygen, and these gases then burn again with the evolution of great heat, and that in this way the steam itself becomes in effect a fuel.

The radical error of such a view is apparent, for in however circuitous a method it may be brought about, exactly the same amount of heat is required to decompose steam to its component gases, hydrogen and oxygen, as these gases would generate in recombining to form steam. If steam be brought into contact with intensely heated fuel it is undoubtedly split up, but the heat necessary to bring about this decomposition is all drawn from the fuel, which in consequence is greatly cooled. Such a decomposition of the steam would be greatest in those parts of the furnace where the heat was most intense, and the effect would be to reduce the intense heat at those parts. The total thermal effect of discharging steam into a fire-box is not to be found in any chemical changes to which it may be subjected en route, but can best be seen by comparing the physical condition as to temperature and pressure of steam when it enters the fire-box, with its condition when it leaves the chimney. It enters the fire at greater pressure but at lower temperature than it emerges from the chimney, and undoubtedly this change is accompanied by the abstraction of heat from the fire.

Careful observation in practice bears out these views, and the writer has consequently used every endeavor to minimize the quantity of steam used for spraying purposes. Compressed air doubtless has its advantages but is undesirable on a locomotive, by reason of the machinery necessary for its provision. For marine purposes the additional advantage of saving fresh water probably justifies the employment of compressed air. Even in this case, however, it is a question as to which is the better, compressed air with its compressing plant, or additional water from a steam evaporator.

With regard to the composition of the base or hearth over which the liquid fuel is to be burnt, if coal and liquid fuel are to be burned in conjunction, a thin layer of slow-burning coal will be found to be most efficient,

with the damper of the ashpan opened sufficiently to give an easy draught and ensure a bright fire. In this direction a variable blast pipe has been found of considerable benefit on the engines of the Great Eastern, when burning liquid fuel in conjunction with coal, the opening of the exhaust orifice being enlarged by 30 per cent. in area, whilst if a return to coal alone is desirable and a sharper blast required a hinged cap provided at the top of the blast pipe and having a reduced area can be shut over the outlet and the velocity of the escaping steam increased.

When liquid fuel is used alone the procedure of working is somewhat as follows: Steam is first raised in the boiler by a wood and coal fire kindled in the ordinary manner, and when from 30 to 40 lb. pressure shows on the gage the fire is leveled over and covered with a layer of broken firebrick of not more than 3-inch cubes. This covering is spread so that it is thinnest about the center of the fire-box and well packed round the sides and corners. A few pieces of waste or wood are thrown in to cause flame and the liquid fuel spray is started by opening the steam supply to the central cones of the burners and admitting the liquid fuel through the regulating valves. At first the fire will appear dull and indifferent, with probably considerable smoke. After adjusting to approximately the requirements of the moment, the second steam supply is opened to admit steam to the jets of the ring blowers, sufficiently to induce the necessary air for complete combustion and to atomize and distribute the spray as already described. The fire soon clears and all smoke disappears.

Hydro-carbons and residues of high flash point and heavy density have been found the best for use as fuel. With a comparatively light, volatile liquid, the material rapidly vaporizes and escapes through the tubes unburnt, frequently lighting at the top of the chimney, whereas denser material of a high flash point enters the furnace as a hot liquid only and is atomized instead of gasified and can thus be more effectively distributed over the grate area with its due proportion of induced atmospheric air. A thin brownish haze from the chimney is the best guide as to the satisfactory nature of the combustion taking place in the fire-box. If there is no smoke whatever there is some likelihood that an excess of air is being admitted, whilst either a thick yellow or a dark black smoke points to too little oxygen for full combustion.

The position of the burners relative to the grate will appreciably affect the noise of working. If too high, the introduction of the oil spray and air causes a series of minute explosions among the products of combustion from the fire below, and an intolerable hum ensues, whereas if the oil fire is maintained along the plane of the coal fire, the action is all but noiseless.

On the Great Eastern Railway coal tar and its by-products have been used as well as those from oil-gas plant, and petroleum distillation residues specially imported for fuel. With some 58 engines equipped the means of storage and supply must necessarily be somewhat considerable and the arrangements at Stratford for this purpose, which are the outcome of considerable experience, are the most complete in Great Britain.

Originally, when but one or two oil-fired engines were in service, each was dealt with separately from a temporary tank (a disused tender body on a raised platform some 14 feet high). It soon became apparent, however, that to reap all the advantages attending the distribution and use of liquid fuel a plant on a comparatively large scale was desirable. The storage now in use consists of a series of underground tanks, having an aggregate of 50,000 gallons capacity, arranged to receive the oil by gravity from the traveling tanks on the railway. A small rotary pump driven by a steam engine delivers the oil fuel into six large cylindrical reservoirs, elevated 20 feet above rail level, and having a total capacity of 42,000 gallons. Outlet pipes controlled by valves operated from a gallery above conduct the oil from these high level reservoirs to filling posts or arms similar to ordinary locomotive water cranes, but somewhat smaller, for filling the tanks of the engines coming to the depot for fuel. The whole plant is worked by four men, one of whom is exclusively employed on the night duty of filling the engines, whilst the other three, a chargeman and two assistants, are engaged during the day in pumping the oil, emptying the traveling tanks and filling any engines arriving for day service.

Fifty engines could be easily and expeditiously dealt with here, and the plant could be practically duplicated without increasing the manual labor. A main line express engine can take 600 gallons of liquid fuel in a period of from four to five minutes. The whole installation is lighted by electricity with portable lamps for the filling arms. It can readily be understood that the facilities of distribution are far greater with liquid fuel than with any system of coaling, no matter how mechanical. At the country depots where liquid fuel is used it is stored in underground reservoirs and is delivered to the locomotives by air pressure displacing it and driving it through the filling pipes. The air is pumped into the reservoir by the air-brake pump of the locomotive, the driver and fireman manipulating the gear precisely as they would if renewing the water supply. The liquid fuel tanks of the locomotive have a fine gauze strainer protected by a perforated cylinder of thin metal; this ensures a thorough clearing and filtration of the fuel prior to its entry into the tanks, pipes and burners, and further acts as a safeguard against any danger from naked lights, should light oils or vapor happen to be present. This is a precaution more necessary when crude oil is used than when residues are employed, and on the Great Eastern Railway, where the latter are usually the fuel, the gauze is employed more for filtration purposes than for the sake of safety.

It can readily be imagined to make an immediate change from the fuel which has been universal on a railway for half a century, working under standard British conditions, would lead to difficulties and troubles far beyond those ordinarily met with in every day working, and the writer when commencing his experiments felt bound to arrange the fittings and apparatus so that the liquid fuel could be used or discontinued at will on the same engine without inconvenience or difficulty. Further, enginemen new to the system are allowed to become conversant with the management of the appliances by slowly and gradually introducing the liquid fuel as an auxiliary to the coal. Driver and fireman then discover for themselves the advantages of the liquid over the solid fuel firing, and consequently make use of the former to the fullest extent. It may be here remarked that the base covering the bars must be kept intact to prevent partial cooling of the furnace by cold air being drawn through.

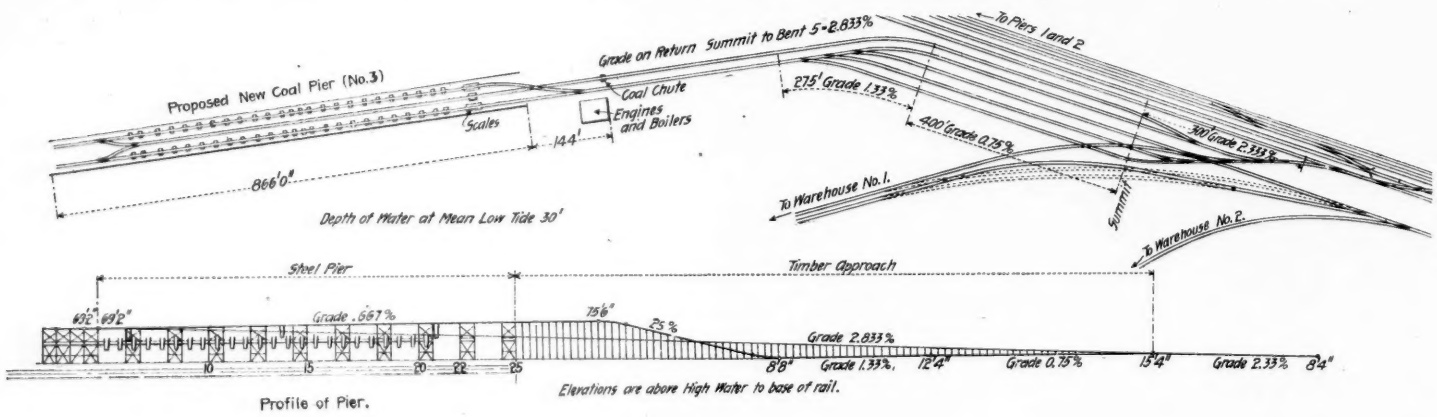
Engines have frequently made the through run from London to Cromer, 138 miles, in 175 minutes, with one stop of four minutes seven miles from the latter town, on a consumption of 190 gallons of tar residues (specific gravity 1.1), equivalent to 14.4 lb. of oil fuel per train-mile; to this must be added 6 cwt. of coal used to light the fire and raise steam, equal to 5 lb. per mile, or a total of 19.4 lb. per mile. On these journeys from 5 to 6 cwt. of broken firebrick (old brick arches) are spread on the grate.

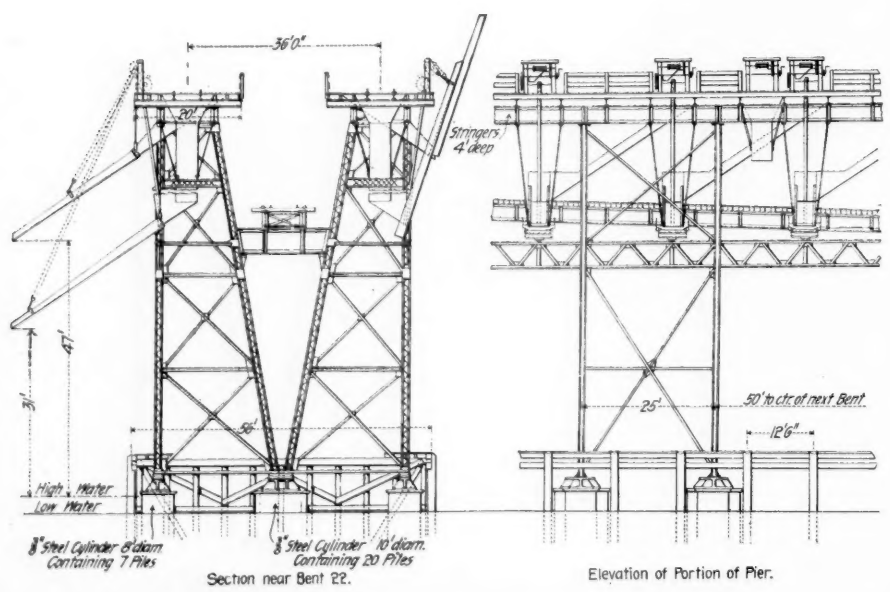
The system used on the Great Eastern Railway has been largely adopted in foreign countries. The Administration of the Imperial Austrian State Railways have a total of 32 engines fitted for operating the Arlberg tunnel railway. The Western Railway of France have several engines on the suburban system of Paris so fired, as have also the Paris, Lyons & Mediterranean and the Paris & Orleans Companies. In the Far East numerous locomotives and stationary boilers have been fitted, countries adjoining the great oil fields of Borneo and Java being particularly well represented in this respect. The demand for fuel has been met by petroleum companies supplying the crude oil minus its lighter constituents. . . . In South Africa the difficulty of obtaining fuel has somewhat retarded modern means of transportation, but liquid fuel burnt under the conditions described and with the writer's apparatus has been successfully introduced as a convenient and satisfactory solution. The carriage of liquid fuel in bulk to countries having no native coal or wood must be infinitely less in cost than that of solid fuel, for one ton of the former will equal two tons of the latter in useful effect and here lies one of the greatest inducements to an extensive adoption.

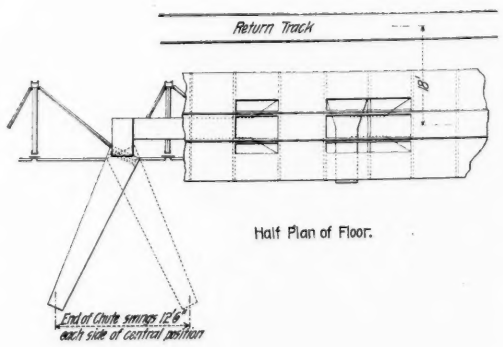
Norfolk & Western Coal Pier at Lambert's Point.

The Norfolk & Western has recently let the contract for building a new steel coal pier at Lambert's Point, Norfolk Harbor, Va., which will be 866 ft. long, with two unloading tracks the whole length. This pier is to accommodate large ocean steamships and has an average height of 70 ft. above high water. It will have 54 chutes by which coal or coke can be quickly loaded into the largest vessels.

The design of the structure is shown in the accompanying elevations and sections, and the location and arrangement of tracks are shown in the plan. The new pier, to be called No. 3, is immediately south of the old piers, Nos. 1 and 2. The foundations will be of steel cylinders 8 ft. and 10 ft. in diam., with piles inside, and filled with concrete. The steel of the cylinders is ⅜ in. thick. The







New Coal Pier at Lambert's Point, Norfolk & Western Railroad.

slips on both sides of the pier will be dredged to a depth of 30 ft. at low water.

Loaded cars will be hauled up the 25 per cent. incline leading to the entrance of the pier by a stationary engine, working through a cable, and from the top of this incline the cars will be handled entirely by gravity, both going and returning. The grades of the tracks, for loaded and for empty cars, are shown in the accompanying profile. The tracks to warehouse No. 1, shown in the plan, are to be changed to the location shown by dotted lines.

John P. Pettyjohn & Co., of Lynchburg, Va., have the contract for building the timber approach to the pier. The cost of all these improvements will be about $350,000.

Piston Valves.

BY WILSON WORSDELL, *Locomotive Supcrintendent North Eastern Railway.*

In 1888, a passenger engine was built by the North Eastern Railway Company with piston valves. These are shown by Fig. 1. Each head has a broad ring which is turned 1-32 in. larger in diameter than the bore of the liner into which it works. The ring is then cut at an angle. To prevent steam passing from the steam chest to the exhaust pipe through the opening formed by cutting the ring, a narrow ring is placed on the exhaust side of the wide ring. This ring is also turned a little larger in diameter than the bore of the liner, then cut and a tongue piece is inserted where the ring is cut, to prevent the steam passing into the exhaust chamber. The openings in both rings are held in fixed positions, so that they pass over a bridge cast in the liner, to prevent steam passing into the steam port.

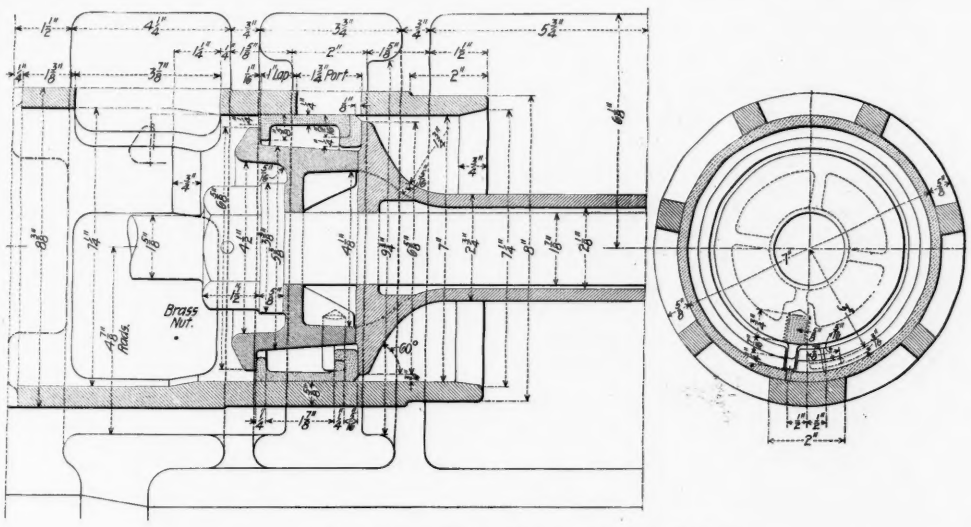


Fig. 1.—Piston Valves—North Eastern Railway, England.

In 1891, a goods engine was built having valves as above described. In both engines air and steam were fitted on the steam chest, so as to prevent a vacuum being formed in the same. Both engines were also fitted with a 2-in. relief valve on the back and front end of each cylinder, to allow water that may be trapped in the cylinders to escape. By a change of enginemen it was found that trapped water did not always escape from the cylinders quick enough to prevent the cylinder covers being broken. It was considered that any form of valve which did not relieve water with the same freedom and velocity as the D slide valve would not be suitable for locomotive practice. This necessitated a reconsideration and a reconstruction in the form of the valve.

The valve now largely used by the North Eastern Railway Company is that shown by Fig. 2. The body is formed by segments free to move inward or outward as required; outward to prevent steam passing from the steam chest to the exhaust chamber; inward to allow trapped water to pass from the cylinders. To increase the bearing surface the exhaust is made deep, being pierced all round by pear-shaped holes to make it flexible, and the holes are so shaped to prevent a line of fracture. When the segments collapse to allow the water to escape there is no communication with the exhaust chamber. The segments move outward to keep themselves in touch with the liner when new and also when reduced by wear. The wear allowance is one-quarter of an inch.

The practice of allowing trapped water to pass into the exhaust cavity is discontinued. The circumference of the valve being great, the water when trapped in the cylinders, and also the steam when compressed in the cylinders above the steam chest pressure, is quickly returned to the steam chest. The water when returned is evaporated. When the locomotive is in operation the maximum force producing friction, is the difference between the steam pressure in the cylinder and steam chest, acting on the segments. When the segments are over a metal surface they are practically balanced. In speaking of the comparative balance, it applies to the D slide valve unbalanced, or partially balanced. This valve possesses all the advantages of the D slide valve. In itself it is practically automatically balanced. It admits of a free passage of water from the cylinders. At or about the end of the piston's stroke the segments cover the steam port, and, so soon as the pressure of the trapped water in the cylinders exceeds the pressure of the steam in the steam chest, the segments collapse, the area exposed in each case being nearly equal, whereas, with the D slide valve the pressure of the water in the cylinders has to be raised to a pressure equal to the pressure of steam in the steam chest covering the total area of the D slide. Maybe the slide will cant, so that one end lifts and the other end remains on the valve face.

As an experiment, the rings, marked A on drawing, on the exhaust side were turned so as to go into the liner a tight fit, the rings being solid. It was found that the engine only remained at work a few days before the valves were reported blowing. Rings with the addition of water grooves turned in the same gave similar results. In practice it is found that the segmental valves, made as shown in Fig. 2, have given results that, after many years of work warrant their adoption they being an absolute success. It has been found that the friction is only about one-eighth that of the D slide valve, the wear of the segments about one-eighth that of the D slide valve, and the wear on the motion work in about the same proportion.

The difference in the cost of manufacture between the D slide valve and the segmental valve, taking cylinders and valves together, is very little. The kind of feed water used does not in any way affect the working of the valve now used on the North Eastern Railway. In a case of foaming and priming, the segmental valve has an immense advantage over the D slide valve, the segments being practically in equilibrium when priming takes place.

Fig. 3 is a copy of diagrams taken from engines 2,012 and 2,013, the mileage respectively being 58,163 and 57,535. The valve motion, and valves, have not been touched, and are now, as shown by diagrams, in as good a condition as they were when the engines were built.

Gateshead, Aug. 9.

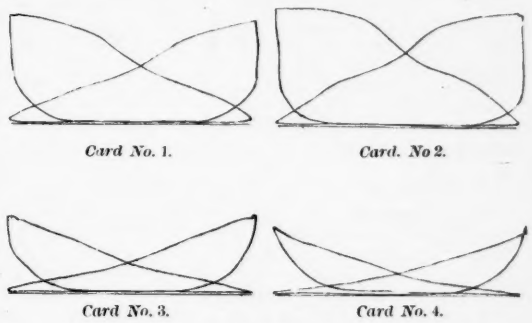


Fig. 3.—Diagrams Taken After Long Service—Piston Valves.

Card No. 1.—Speed, miles per hour, 35.
Indicated horse power, 694.4.
Area of regulator port opening, 2.25 sq. in.
Boiler pressure, 185 lbs.

Card No. 2.—Speed, miles per hour, 21.
Indicated horse power, 521.7.
Area of regulator port opening, 3 sq. in.
Boiler pressure, 165 lbs.

Card No. 3.—Speed, miles per hour, 44.
Indicated horse power, 458.6.
Area of regulator port opening, 1.87 sq. in.
Boiler pressure, 180 lbs.

Card No. 4.—Speed, miles per hour, 58.5.
Indicated horse power, 368.1.
Area of regulator port opening, 2.25 sq. in.
Boiler pressure, 170 lbs.

Automatic Signal Locations.*

In making a survey for the installation of automatic signals one of the greatest problems to be solved is that of location. Signal engineers sometimes find after automatic signals are put in service that some are of little value owing to poor sight or difficulty in starting trains. Sections of road have sometimes been blocked off by the use of a track chart and a trip over the territory on a special train moving at 30 to 60 miles an hour. This is called a preliminary survey, but the later survey is neglected, an estimate being required at once, and it is hard to get an additional appropriation for additional signals afterward.

In locating we must consider the relation of the signal to sight, passing sidings, crossovers, interlocking plants, junction points and passenger stations; and the length of block. It is often a serious problem to get a good location on a series of short curves, and often it is necessary to lengthen or shorten the block in order to get even a fair sight. The advantage of a home and a distant signal over the single home is that trainmen are always in a position to know if the next home signal in advance is clear or against them.

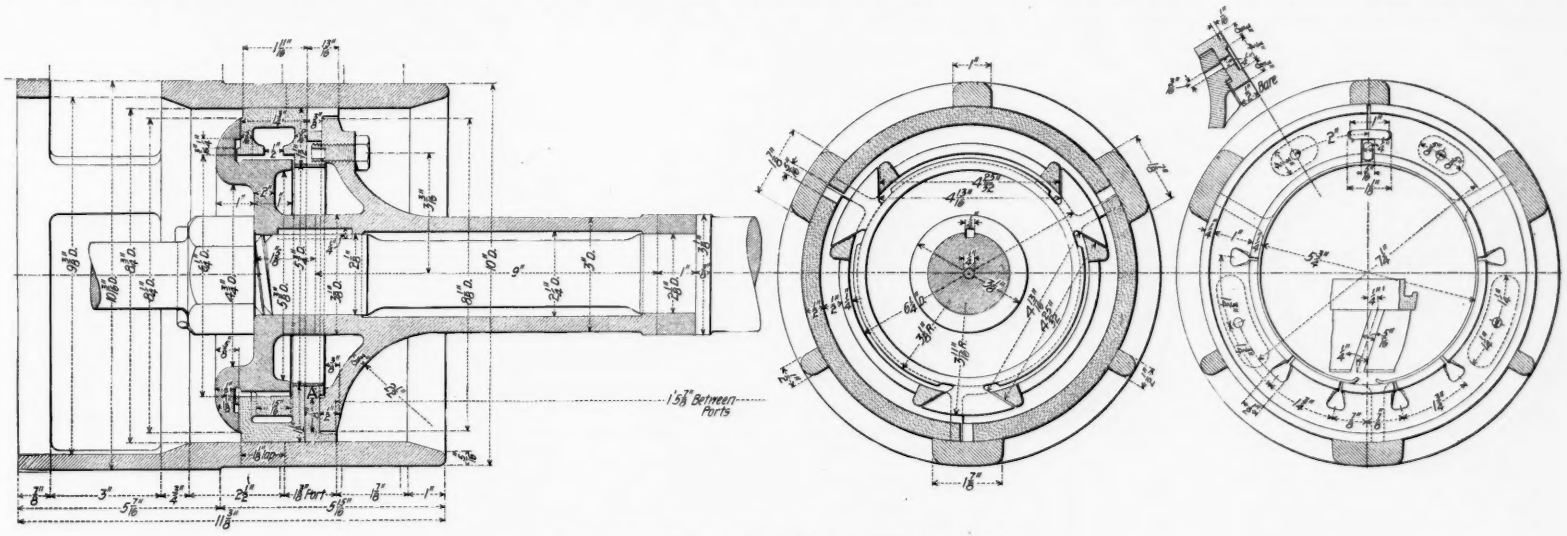


Fig. 2.—Piston Valves—North Eastern Railway, England.

Signal bridges should preferably be used where there are four or more tracks; but if too expensive, bracket poles can be used for four tracks. On single or double track wood or iron masts should be used, either straight or bracket, as may be required. At passing sidings the signals should be placed back of the fouling point of the outlet switch, so as to protect a train moving from the

* A paper by C. C. Rosenberg, Signal Engineer of the Lehigh Valley, to be read before the Railway Signaling Club at St. Louis, Nov. 13.—Condensed.

siding to the main track; this will allow an approaching train on main track to advance one block further than if the signal were placed ahead of the switch. No signal should be placed immediately ahead of an outlet switch and used as a starting signal, but in order to give a train moving from a passing siding a starting signal it should be placed at a distance far enough in advance of the outlet so that it cannot be mistaken by a train approaching on the main track as its signal. The train moving from the siding to the main track should proceed cautiously and under full control until the next signal is reached. The proper location for a signal at the inlet of a passing siding is within 500 ft. of the switch points; and the next signal in the rear should be placed not more than three-quarters of a mile from the switch; preferably less.

No location should be made immediately in advance of a crossover, but far enough in the rear to protect the same, should the location be found to come in the vicinity of such crossover. Locating signals on the outside of curves should be avoided as far as possible; but if this is found necessary, then the masts should be high enough to place the signals so that they can be seen from approaching trains over the top of a train passing in the opposite direction, or a train standing on a siding. Telegraph pole lines should, wherever practicable, be moved as near the outside line of the right of way as possible so as not to obstruct the sight of signals. All undergrowth and overhanging trees should be kept trimmed, so that a good view can always be had.

At interlocking plants and junction points where interlocking is used the signals should be so located that traffic through these points will be facilitated and absolute safety guaranteed. The automatic signals should be placed from 1,800 to 2,000 feet back of the main line mechanical home signal and the mechanical distant signal eliminated. The home signal on this mast should govern to the mechanical home signal only; the distant signal on this mast should not give a clear indication until the main line mechanical home signal is in the safety position and the next automatic in advance is clear; this last mentioned signal should be placed just beyond the interlocking limits. The main line mechanical signal should be slotted. Should there be a diverging route to a high speed track the mechanical signal governing this track should be slotted also. In this case the distant automatic in the rear will display caution when the mechanical signal governing the diverging route is in the safety position. This is not objectionable, for the reason that trains about to take the diverging line should not proceed at full speed through the switches.

The placing of disk signals on masts with mechanical signals has been found to be unsatisfactory, especially where both home and distant are used. Indicators should be placed in all interlocking stations in order to give the levermen ample notice of the approach of trains.

At junction points where no interlocking devices are used and where passenger and fast freight trains come on to the main line, a signal should be located on the branch or connecting road near the junction point so as to give information of the condition of the track on the main line after the route has been set up.

In order to give extra protection to trains handling freight and passengers at stations, a signal should be located from 1,000 to 1,200 feet on either side of the station; this will allow an approaching train to advance and often avoid making a stop at the signal in the rear, should a train be standing within station limits.

The length of block must be determined by traffic and track conditions. Where the traffic is not very heavy and the line level or not more than 0.5 per cent. grade, one mile blocks are considered very good practice. If traffic is congested this distance should be reduced to from one-half to three-fourths of a mile. On approaching ascending grades over 0.5 per cent., blocks should be gradually shortened until a uniform length can be maintained; this in order to avoid unnecessary stops for following trains. On descending grades blocks can be lengthened to conform to traffic and grade. In territory comparatively level and where traffic is not congested one and one-half to two-mile blocks can be successfully operated.

No signal should be located just beyond a sag or apex, as a train obliged to stop at such signal is liable to break in two in starting.

Before making a final survey it is well to consult with the engineering and operating departments relative to possible or contemplated track changes, such as locations of crossovers and siding switches. In some cases present sidings may be eliminated before signal work is begun, thereby saving considerable expense.

After locations have been made and considered from a signaling standpoint, the transportation department should be consulted and the ground thoroughly canvassed, so as to determine definitely that the signals as located can be successfully operated. It is also a good plan to get the views of competent enginemen as to locations, and ascertain from them if any are in localities liable to cause trouble.

In some foreign countries the practice of locating signals for sight is to use a full-sized templet of a mast and blade and send out a locating party. After a place has been selected the templet is placed in position and viewed from an approaching train. If not seen to good advantage the templet is moved from place to place until the best situation has been obtained. This accomplished for day signals, the same process is followed at night with a light. Frequently it is found that the location which is best for a day signal may not answer for a night signal. While this method may at first glance seem to be unnecessary, it is certainly well worth considering.

The New President of the Southern Pacific.

The glory of the old Wabash as a breeding ground for railroad officers, is to be still further spread as Mr. Hays, General Manager of the Grand Trunk, is to succeed Mr. Huntington as President of the Southern Pacific. Mr. Hays is a vigorous man, in the flower of his years, with a thorough practical training behind him and a reputation established, and the Southern Pacific may be congratulated upon getting him, as he may be congratulated upon having so important a career opened up before him.

Mr. Hays is only a little past 44, having been born at Rock Island, Ill., May 16, 1856. He began railroad work when he was 17 as a clerk at St. Louis in the employ of the Atlantic & Pacific. In the beginning of 1877 he was made secretary to the General Manager of the Missouri Pacific, and in 1884 he took a like position on the Wabash, St. Louis & Pacific. Two years and a half later, when he was 30 years old, he was made Assistant General Manager of the Wabash Western, that is, the part of the lines west of the Mississippi River, and finally, when the reorganization took the shape of the present Wabash, he became General Manager of the entire road, and Vice-President February 1, 1894. He

Charles Melville Hays.

remained here until January 1, 1896, when he was made General Manager of the Grand Trunk, where his career has been eminently successful. He has been helped by certain able American officers whom he has taken over the border, and we judge has been loyally backed by Sir Charles Rivers Wilson, the President, and by the English directors.

Of course Mr. Hays has had the advantage of working during a period of growing general prosperity, but, nevertheless, he must be credited with much of the advance which has taken place in the five years in the condition of the Grand Trunk. For eleven years out of the preceding fourteen there had been an annual deficit, the only dividend payments having been on the guaranteed stock, and none on that stock after 1893. During Mr. Hays' administration the gross earnings on practically the same mileage have increased from 17⅔ millions in 1895 to 21½ millions last year and the net revenue has been increased by nearly 2½ millions. The percentage of working expenses to gross earnings has fallen from 71¾ in 1895 to 65⅔ in 1899. With practically no change in the total passenger and freight train mileage, the number of passengers carried has increased 17 per cent. and the tons of goods carried 23 per cent.

Since October, 1898, the guaranteed 4 per cent. dividends have been paid on the guaranteed stock and last year 4 per cent. was paid on the first preferred, and this year the full 5 per cent. besides a dividend on the second preferred, the first since 1888. At the same time large sums have been spent on improvements to road and equipment. For a summary of these improvements the reader is referred to the *Railroad Gazette*, Oct. 12, page 675. The company has acquired a controlling interest in the Central Vermont, which adds about 500 miles to the system.

It seems to be understood that Mr. Hays will devote himself more particularly to the operating side of the Southern Pacific than to the financial.

The Locomotive Exhibit at Paris.*

BY CHARLES ROUS-MARTEN.

Pursuing my idea that the salient principle of the Exposition of 1900, so far as locomotives are concerned, is increased haulage power, I come next to the special method of attaining that end, which the present Exposition has brought to the front in so remarkable a degree. I mean the development of compounding. Outside of the British section, by far the larger number of engines are constructed on one or another of the numerous compound systems. . . . In view of the fact that every leading railway in France is represented, as are also certain German and Swiss lines, by one locomotive or several, all constructed on one particular system of compounding, however much they may differ in general design or in details, I think I am warranted in according a certain prominence to that system. It is the one invented by Mons. A. G. de Glehn, Director-General of the Société Alsacienne de Construction Mecaniques. . . . More than 800 locomotives constructed on this system are now at work on the European Continent.

The Chemin de Fer de l'Etat, or State Railway of France, has, however, recently placed on its road four express engines of the four-cylinder compound type, but of a different design, viz., the Vauclain, which is so largely in use on the American Continent. The Vauclain system differs from the de Glehn mainly in having all its four cylinders placed outside the frames, the high-pressure being superposed above the low-pressure, and in the two piston rods on either side driving on to one cross-head, whence the connecting rod propels the rear pair of coupled wheels. Thus all the four cylinders drive the same axle and pair of wheels, as in the case of the Webb compound "La France," but in the latter case the two high-pressure cylinders are outside and the two low-pressure cylinders inside, as in the de Glehn system, in which, however, each pair of cylinders drives a different axle.

The use of a single axle for the transmission of the whole propulsive power of the locomotive is to be found also in the four-cylinder tandem compounds, of which several instances are to be met with at Vincennes, and in the two-cylinder systems of Mallet and von Borries. Theoretically, no doubt, the heavy strain placed on a single axle by subjecting it to the pull of four cylinders is undesirable. . . . The theoretical disadvantages attaching to the employment of a single driving axle with four cylinders do not appear to have made themselves felt in actual practice. . . .

I have already referred to the general development of haulage power in the engines shown, as compared with those exhibited on former occasions. As the compound method has come into use mainly since the last Paris Exposition, and as the vast majority of the locomotives displayed in this instance are compounds, it is not easy to institute any precise statistical comparison between the relative tractive force possessed on the average by the locomotives of 1889 and those of 1900. . . . But the striking and valuable development of the past decade has been in the most important direction of all, namely in boiler-power and steam-pressure. For whereas in 1889, a boiler with 900 to 1,100 sq. ft. of heating surface was deemed ample for many of the most prominent express engines in England, such as those of the Great Northern and South Eastern lines, and a total heating surface of 1,200 to 1,300 sq. ft. was rarely exceeded, there are very few main-line engines at Vincennes, other than British, which have less than 1,800 to 2,000 sq. ft., and even two of the four purely British express engines shown have 1,630 and 1,768 sq. ft., respectively, while M. du Bousquet's new engine for the Northern of France line, No. 2,642, has no less than 2,275 sq. ft. Again, in 1889, a steam pressure of 160 lbs. to the sq. in. was the maximum in ordinary use; 175 lbs. was comparatively rare and was regarded as more or less of an experiment of dubious value. But in 1900 a large proportion of the engines at Vincennes have 200 lbs. steam pressure or more. Most of the new French locomotives have 213 lbs. at the least, and the newest of all, M. du Bousquet's huge 10-wheeled "Atlantic" type, express No. 2,642, for the Northern line, and M. Salomon's eight-wheeled express engine, No. 2,411, for the Eastern Railway of France, have each a steam pressure of no less than 228 lbs. to the sq. in. Of the four English engines, two—the London & North Western and North Eastern exhibits—have 200 lbs. of steam pressure; the Great Eastern engine has 180 lbs., and the Midland 170 lbs. . . .

Messrs. Burnham, Williams & Co. have on show at Vincennes a very fine Vauclain-compound express engine, constructed at the Baldwin Works to the order of the State Railway of France, and ostensibly exhibited by that railway together with one of its standard express engines on the de Glehn system. The Vauclain compound supplied to the Etat railway is of the ordinary American type.

Notwithstanding the lack of that minute and delicate "watch-finish" which is to be found in the British engines, and the absence of which in this case is so strongly commented upon by certain British critics, my own experience of American engines in various lands impels me to anticipate that this one and its brethren will be found to perform excellent service on the State Railway of France. The type of engine which has more representatives than any other in the Exhibition of 1900 is the four-cylinder compound on the de Glehn system, illustrations of which are shown by every leading railway in France. In my previous article I referred to the magnificent express en-

*From the *Engineering Magazine*. November issue; extracts from the second article by Mr. Rous-Marten. The first was published by us (abstract only) some weeks ago.

gine which represents the most recent development of the system, that designed by Monsieur du Bousquet, ingénieur-en-chef for the Chemin-de-Fer du Nord, and numbered 2,642.

Making a special trial of this engine I found it able to take a heavy express weighing 305 tons (English) behind the tender, from Paris to St. Quentin, a distance of 95¾ miles, in 90 minutes 52 seconds, start to stop, maintaining an average of 62.1 miles per hour up a 13-mile rising grade at 1 in 200—the minimum rate being 59.2—and 74.5 miles per hour on a long stretch of level and slight ascent. Down the falling gradients the speed was not permitted to exceed the limit prescribed by law, namely 120 kilometers or 74.5 miles per hour. This performance has no parallel in my personal experience.

The exhibits of the other French railways may be summed up in the remark that they are mainly variants of the Nord engines. . . . One engine, however, belonging to the State Railway of France, which is shown at Vincennes, is in reality the exhibit of the Baldwin Works, where it was designed and constructed. It is a very fine 7-ft. coupled non-compound express engine of the Atlantic type, and is one of ten supplied by Messrs. Burnham, Williams & Co., to the Chemin de Fer de l'Etat.

The engines shown by the P. L. M. Railway of France, and also one of those exhibited by the State line, have the "wind-cutter" fronts that have so long been in use on the P. L. M. line, not only the smoke-box, but also the chimney, the dome-cover, and the cab being shaped so as to present a prow or acutely-angled wedge to the air passed through by the engine. As careful experiments have shown that the resisting or retarding effect of an absolute head-wind is so small as to be virtually negligible, owing to the relatively small surface presented to it by an advancing locomotive, while the wind-cutters would present an increased surface of resistance to any wind at all on the side of the course, and would present the maximum of resisting surface to the worst wind of all—that blowing partly sideways and partly in front—I regard its effect as far more mischievous than beneficial. . . .

Some very large and massive Austrian engines are exhibited, chiefly of the two-cylinder compound—gorlsdorf—type. A ten-wheeled express engine with six-coupled 6-ft. wheels, 200 lbs. steam pressure and a weight of 69 tons; a huge double-ended mogul-class goods weighing 70 tons, and a consolidation-class goods of 69 tons weight, are among the most noticeable.

Among the Hungarian locomotives, a fine 7-ft. coupled, two-cylinder compound express weighing 64 tons may be commended, but the most remarkable of the Hungarian exhibits is a double-four-coupled articulated Mallet compound goods engine which has each separate set of four-coupled wheels driven by its own pair of outside cylinders, one high-pressure and one low-pressure, one set being virtually a steam bogie, somewhat after the Fairlie method. A similar mode of construction occurs in one of the large Russian engines to which I shall have occasion to refer directly.

In the German section several interesting exhibits are to be found. A complex engine on the Klose system for working a rack railway; a still more complex ten-wheeled tank engine, partly four-coupled and partly six-coupled—which would require a whole magazine-full of description to itself to make its design clear—the motion being transmitted from one set of coupled wheels to the other by an elaborate system (Hagan's) of rods, etc.; the peculiar Krauss engine with independent "donkey" assistant working between the two wheels of the leading bogie—referred to in my first article; another Krauss engine, a huge ten-wheeled four-coupled express weighing 68 tons, having a leading Bissel truck and a trailing four-wheeled bogie; and a fine four-coupled express by Borsig, with a steam super-heater appended to its smoke-box—all are notable and merit fuller notice than space permits me to bestow.

One of the two Italian exhibits, that shown by the Adriatic line, was noticed in my previous article. It is a four-cylinder compound, but in addition to the peculiarities already described it has this other one, that both its high-pressure cylinders are placed on one side and both its low-pressure on the other. . . . As to the Russian engines, it may be generally said that their vast size is their most striking feature. One is a "consolidation" goods, two-cylinder compound, weighing 65 tons and having a low-pressure cylinder no less than 29¼ in. in diam., so that, as the eight coupled wheels are only 4 ft. 1 in. in diam., the cylinder-casing seems but slightly above the rail level. Another is a four-coupled express on the four-cylinder tandem-compound system. A third is a ten-wheeled two-cylinder-compound express with six-coupled drivers 6 ft. in diam., leading bogie, and outside cylinders. But the most remarkable Russian engine is the gigantic twelve-wheeled double-six-coupled duplex compound, on a modification of the Mallet system, and bearing the number H. 810. This is by far the biggest and heaviest engine in the whole Exhibition, weighing as it does 86 tons, and having a vast 46-ton tender appended; the total weight of engine and tender being therefore no less than 132 tons, while the top of the chimney stands 16 ft. 9 in. above the rail level. This mighty locomotive is constructed on the articulated plan, the 4-ft. driving wheels being coupled in two groups of six each, one being practically a steam bogie, while each group is driven by one high-pressure and one low pressure cylinder, the respective diameters being 18¾ in. and 28 in.

Summarizing the Vincennes show of locomotives as a whole, I may say that there are 64 steam locomotives exhibited, of which 37 are compound and 27 non-compound. Of the former 18 have four cylinders, 16 have two, and one has three cylinders. In the total number of locomotives only one has single driving wheels; 30 have four wheels coupled; 17 six wheels coupled; 4 eight wheels coupled, and 4 have articulated systems with the coupled wheels in two groups. All these are of the normal or the Russian gage. There are also eight engines for a gage of one meter or narrower. In addition to the 64 steam locomotives, there are three electric motors of various designs; several tramway engines and a large number of magnificent passenger cars and goods wagons. Within my present limits I must confine myself to the remark that of the different types of valve-gear in modern use the Walschaert is applied to no fewer than 44 of the 64 locomotives exhibited, the Stephenson to 10, and the Gooch to two.

My review would be incomplete did I neglect to notice one most extraordinary steam locomotive which is to be seen at the Paris Exhibition, but not among the others in the Vincennes Annex, specially appropriated to that object. It is the enormous express engine shown by Messrs. Schneider et Cie., of Creusot, France, as the central figure in their great display near the Eiffel tower. It runs on no fewer than 14 wheels, four being coupled and 8 ft. 3 in. in diam. It has a leading four-wheeled bogie and a trailing six-wheeled bogie. The two cylinders, 20 in. x 27½ in., are outside and drive the front pair of coupled wheels. The driver is provided with a wind-cutter cab in front of the smoke-box and can communicate by means of speaking tubes with the fireman, who occupies the footplate in the ordinary position. The engine alone weighs 81 tons; the total heating surface is 3,250 sq. ft. The tender is enormous and runs on 10 wheels, disposed in two bogies, one six-wheeled, one four-wheeled. Thus the engine and tender together run on 24 wheels. This tremendous machine, which is stated to have been built for swift "international trains," was designed by Monsieur Thuille, who unfortunately lost his life during some preliminary experiments with his huge creation. The Schneider locomotive is undoubtedly a magnificent piece of mechanism, but I have been unable so far to discern its *raison d'etre* or any satisfactory promise of such results as alone would justify what must be its excessive costliness. Also, it certainly appears to me deficient in constructive strength, but it would be premature at present to hazard any definite or final judgment upon a design so novel and as yet virtually untried in regular practice.

The Preservation of Timber—Discussion.*

Walter W. Curtis, M. Am. Soc. C. E. (by letter).—There is now, and will be in the future to a greater extent, a strong desire to experiment with new wood preservatives. The two methods now in use are old. The evidence of their value, in the writer's opinion, is sufficient to justify their general adoption, but is not as complete as could be desired, and, from the nature of things, is not likely to be. The difficulty of keeping tie records on long lengths of road for 15 and 20-year periods is such that those who desire to find fault with them will always have opportunity. One of the greatest dangers to the cause of timber treatment in this country is likely to be this desire for something new—and cheap.

Mr. Kummer describes a treatment intended to overcome certain mechanical difficulties "in connection with creosoting, particularly railroad ties." Evidently, he refers to the fact that creosoting does not harden timber and that the usual allowance for ties, 10 lbs. of creosote per cubic foot, does not completely saturate the wood. This is undoubtedly true, but it seems hardly fair to condemn creosoted ties therefor, without some more definite data as to actual bad results. The recorded history of creosoted ties in the United States is not very great, but, so far as it goes, does not indicate that the deterioration from rail cutting is so serious as to detract greatly from the value of the treatment. If Mr. Kummer has shown a means whereby such difficulties as do exist, however great or small they may be, can be removed, he has earned the thanks of the profession; but we must be careful lest, in running from the troubles of which we know, we do not also leave good qualities of which we are certain. As the paper did not state the comparative cost of the creo-resinate treatment and ordinary creosoting, the writer inquired of the company operating the process, and was told that the costs were the same, using equal amounts of preservative material in each case. For a tie creosoted with 9 to 10 lbs. per cu. ft. the English records show a life of from 16 to 20 years; using a rail supported in a cast chair. If creosoted ties here are provided with tie-plates, at an additional cost of about 10 cents, there is every reason to expect as long service; indeed, Mr. Boggs, in his discussion of the writer's paper, states that on the Houston & Texas Central 80 per cent. of the creosoted ties laid there in 1877 were still in service after 20 years, and that without a tie-plate.

The author's remarks as to the necessity for complete sterilization in creosoting are no doubt correct. In this respect the chloride of zinc treatment has an advantage, for, while sterilization there is probably advantageous, the use of heat is primarily to so season the wood and open the ducts, as to permit the entrance of the preservative fluid. This completely saturates the timber, if properly done, and the preserving and toxic agent is deposited throughout all parts of the timber. There is a decided lack of data as to the penetration of heat into ties during steaming, and the figures given in the paper are welcome and pleasing as well, demonstrating, as they do, the thoroughness of the steaming in Burnettizing. Mr. Kummer states, "with a temperature of 230 deg. Fahr. in the cylinder, 178 deg. was secured at the center (of the tie) in 2 hours, while with 290 deg. at the outside, 249 deg. was secured in 2 hours." Presumably, the 2 hours referred to is the time interval between the admission and exclusion of steam to and from the cylinder. In Burnettizing, it is customary to steam for at least 3 hours, the temperature being from 250 deg. to 260 deg. Fahr. The mean of the two cylinder temperatures given by Mr. Kummer is 260 deg., and the mean of the resulting tie temperatures is 213½ deg.; so it is reasonable to conclude that the usual practice in Burnettizing results in complete sterilization. With reference to the use of a higher temperature under pressure, without injury to the timber, the writer has no data. He is not satisfied with any explanation of the philosophy of it, known to him, but the evidence seems to support the claim. The danger to be feared is not so much the checking of the wood, as the breaking down and disintegration of the fiber. It would be very interesting to know the relative absorption of preservative by timber treated according to the author's method and by the use of heat of 250 deg. for the same length of time without pressure.

Mr. Kummer states that thorough sterilization is not generally secured during creosoting treatment. What evidence has he that the temperature of 212 deg. at the center of the tie is not secured in creosoting?

The use of the creo-resinate process is recommended by Mr. Kummer for marine work. The writer recently received a letter from Mr. J. W. Byrnes, Superintendent of the timber treating works at Beaumont, Tex., whose experience in this line extends back some 30 years. He states that Mr. J. W. Putnam made a test of a combination of resin and creosote, while operating the works at Pascagoula. "He treated a quantity of sheet piling for the Galveston Wharf Company, about 10 years ago, and in less than 2 years the teredo had completely destroyed the wood. The wood showed a perfect saturation, but, while only one-third resin had been used to two-thirds oil, there was no odor or sign, other than color, that would indicate that a particle of dead oil had been used. The resin had totally destroyed the quality of the oil as a preservative against the teredo. About 1869, one of the leading chemists and physicians of New Orleans conceived the idea of treating wood with a mixture of resin-oil and resin, for marine use. The treatment seemed to give the wood a relish for the teredo. The test was destroyed totally within two years. While the treatment of wood with a mixture of dead oil and resin may be effective as a preservative against decay, it has been positively proven by thorough tests that no good results will be obtained when used for marine work." The process described by the author differs somewhat from that followed by Mr. Putnam; and it may be that the differences are sufficient to secure a more happy result. As a matter of history, however, the foregoing should be recorded.

Mr. Byrnes is strongly of the opinion that, to get satisfactory results from creosoted timber in marine work, it must be allowed to dry out for from 30 to 60 days after treating, when the creosote in the outer part of the timber becomes thick and gummy. If this is done and the treatment has been properly given, he is satisfied that no difficulty will be experienced with the washing out of the creosote; and the durability of the work will prove satisfactory.

It is to be hoped that future experience with the creo-resinate treatment will demonstrate its value to be as great as the author anticipates. The writer, however, is less interested in improving upon creosoting practice than in approximating the results secured thereby at a less cost. The great need of the railroads to-day is to demonstrate or confirm the value of the zinc chloride treatment; and to improve thereon.

R. Montfort, M. Am. Soc. C. E.—The writer's attention has been called to Mr. Boggs' communication, published in the September, 1900, *Proceedings*, in which the following statement is made: "R. Montfort, M. Am. Soc. C. E., Chief Engineer of the Louisville & Nashville Railway, is in a better position than any one known to the writer to speak with authority on the action of the teredo on creosoted piles, as his line traverses a number of salt water inlets along the Gulf Coast, and probably owns one of the oldest creosoting plants in the country. It is the writer's impression that he has entirely abandoned treating his piling, and is now protecting it with salt-glazed sewer pipe, as creosoting did not protect against the teredo." Mr. Boggs is mistaken in his impression. The Louisville & Nashville, during the past twelve months constructed a large dock and warehouse at the foot of Commendencia street, Pensacola, Fla., in which some 6,000 creosoted piles, averaging 70 ft. in length, and treated with 20 lbs. of creosote oil per cu. ft., were used. In addition to this, during the same period, about 2,000,000 ft. of sawed timber were used by this company on the wharf referred to, and for bridges, culverts, etc.

It is true that after a service of 14 years the creosoted piles in trestles across Biloxi Bay, and Bay St. Louis, on the New Orleans & Mobile Division, and across Escambia Bay on the Pensacola & Atlantic Division of the Louisville & Nashville Railroad, were found to be attacked by the teredo, and the piles in these trestles were further protected against the teredo by concrete or by vitrified clay pipe as described in a paper by the writer, read before this Society Nov. 1, 1893. The same creosoted piling, driven in 1878, namely: 2,626 piles at Bay

*Continued from September, 1900. *Proceedings* American Society of Civil Engineers. See May, 1900, *Proceedings*, for paper on this subject, by F. A. Kummer, Jun. Am. Soc. C. E.

St. Louis, and 1,648 piles at Biloxi Bay, or a total of 4,274 piles, with the exception of three that have been replaced by new piles on account of rot, and 122 piles that were destroyed by the hurricane of Oct. 2, 1893, are still in use, giving good service and with prospect of lasting several years to come. Untreated piles at these bridges would not last, on an average, more than seven years as against rot, or six months against the teredo.

The writer believes Mr. George S. Valentine, who for years has been in charge of the Eppinger & Russell Co. Creosote Works, Long Island City, N. Y., treated piles in the early 70's that were driven in Galveston Bay, and are still doing service if they have not been destroyed by the recent hurricane.

It is to be regretted that further experience with piles treated with dead oil of coal tar and resin has not given us the satisfactory results hoped for. In 1890, it having been found that the teredo had commenced to attack the piles in piers of East and West Pascagoula River bridges, driven in 1876, it was decided to strengthen the piers by replacing two piles at each end of each pier, consisting of 16 piles. These piles were 80 ft. long, 10 in. in diam. at the small end, and were driven 40 ft. into the bottom of the river. They were treated with a mixture of resin and oil in the proportion of 45 bbls. of resin to 30 bbls. of creosote oil, which is about the same proportion Mr. Kummer proposes to use. The total number of piles treated in this way and driven at these bridges was 88. A recent examination of these piles for rot, by boring, showed that of the inside piles driven in 1876, and therefore 24 years old, only 8 per cent. showed rot in the heart, while of those treated with the mixture of oil and resin, driven in 1890, and only 10 years old, 43 per cent. showed rot in the heart. An examination by diver showed that the piles 24 years old, originally treated with creosote oil, were in better condition than the piles only 10 years old treated with the creosote oil and resin mixture. From this it will be seen that the idea of mixing resin with the creosote oil did not originate with Mr. Kummer, but was used by the late J. W. Putnam, Assoc. M. Am. Soc. C. E., who did the work referred to, under contract, more than 10 years ago.

American Railway Association.

The fall meeting of this Association was held at Boston, Oct. 24, with a large attendance. The membership of the Association now represents over 186,000 miles of railroad. The Executive Committee reported that the International Railroad Congress had accepted the invitation of the Association to hold the next Congress at Washington in the year 1904.

The Train Rules Committee reported that it had answered a number of queries concerning practice under the rules, and also reported progress in the compilation of a revised code of rules for railroads having two or more main tracks. The Committee on Interlocking and Block Signals reported a revised code of rules, which was adopted. This code contains nothing very different from that already in force, the present revision having been undertaken for the purpose of making these rules uniform in phraseology and arrangement with the rules for block signaling.

The Committee on Car Service reported a code of rules on the subjects embraced in the provisional code which was discussed at the last meeting. This code has to do chiefly with the question of what constitutes the delivery of a car from one railroad to another. The code was discussed at considerable length and, with slight amendments, was adopted.

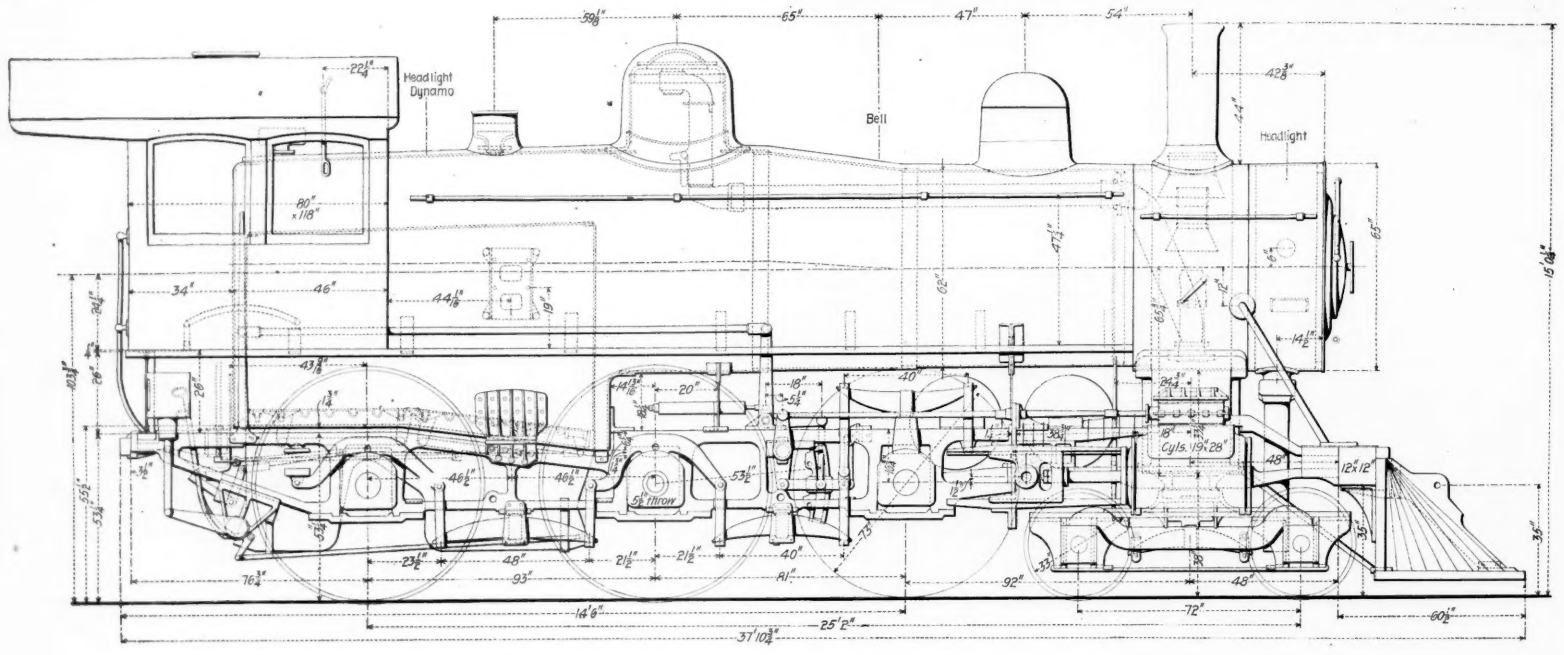
The Committee on Statistical Inquiry presented some data concerning forms of reports. The Committee on Standard Dimensions for Box Cars reported progress.

The election of members of committees resulted as follows: On Car Service, Wabash; Delaware, Lackawanna & Western; New York, New Haven & Hartford. On Safety Appliances, C., C., C. & St. L.; Philadelphia & Reading; Chicago & Northwestern. On Nominations, J. M. Hood (Western Maryland), and W. F. Potter (Long Island).

The next meeting is to be held in New York City, April 24, 1901.

Some New Locomotives of the Plant System.

Five 10-wheeled passenger locomotives and six 10-wheeled freight locomotives were lately delivered to the Plant System by the International Power Company, Providence, R. I. The engines, by class, differ only in those points that distinguish locomotives of the same general design and approximately equal weight when they are to be used severally for freight and passenger work. For example, the total weight of the passenger engines is 146,000 lbs., of which about 108,000 lbs. is on the drivers, and the total weight of the freight engines is 150,000 lbs., of which about 111,000 lbs. is on the drivers. Steel castings have been extensively used in these engines, the principal cast steel parts being driving wheels, driving boxes, steam chests, cylinder heads, crossheads, rocker shafts, footplates, and expansion pads. The design of the crosshead, as shown, in accompanying illustrations, is interesting in this connection. It may be noted that the back end of the piston rod has a shoulder fit in the crosshead and is set with a pair of lock nuts, thus dispensing with the customary crosshead key. The engines were built from designs of Mr. W. E. Symons, Superintendent of Motive Power of the Plant System. A noticeable feature is the



New Passenger Locomotive of the Plant System—Built by the International Power Co.

variable exhaust nozzle tip. In the table are given the chief specifications for both kinds of engine, and although they are identical in many respects the list is given in full for convenient reference.

The tender trucks of both classes of engine are American Steel Foundry Co.'s cast steel; tender truck wheels are McKee-Fuller spoke, 36 in. diam. for passenger, and 33 in. for freight; tank capacity, water, 5,000 gals.; tank capacity, coal, 9 tons; tender frame, 10 in. steel channels; wheel base tender, 16 ft. 10 in.; total wheel base, engine and tender, 52 ft. 3 in.

The engines are equipped with the following special devices: U. S. Metallic Packing for piston rods and valve stems, Ashton steam gage, Leach's double pneumatic sander, driving box and rod journal bearings of Ajax metal, engine and tender equipped with Westinghouse American Brake 9½-in. air pump. The freight engines have two No. 10 Monitor injectors, the passenger engines have Hancock composite injectors; boiler shell of Schoenberger steel; fire-box of Carbon steel; stay bolts of U. S. (Brown), Ewald and Falls hollow stay bolt iron; Star headlight on freight engines, Pyle electric on passenger engines; Minto blow-off cock.

SPECIFICATION OF LOCOMOTIVES—PLANT SYSTEM.

	Passenger.	*Freight.*
Gage	4 ft. 8½ in.	4 ft. 8½ in.
Fuel	Bituminous coal	Bituminous coal
Weight on drivers	108,000 lbs.	111,000 lbs.
Weight on truck	38,000 lbs.	39,000 lbs.
Weight of engine, total	146,000 lbs.	150,000 lbs.
Weight of tender, loaded	100,000 lbs.	100,000 lbs.
Weight of tender, light	39,000 lbs.	39,000 lbs.
Cylinders	19 in. x 28 in.	20 in. x 28 in.
Wheel base of engine, total	25 ft. 2 in.	25 ft. 2 in.
Wheel base of driving wheels	14 ft. 6 in.	14 ft. 6 in.
Height to center of boiler above rail	8 ft. 7¾ in.	8 ft. 4¾ in.
Height of stack above rail	15 ft. 0 in.	14 ft. 10¼ in.
Heating surface of fire-box	179.8 sq. ft.	184.00 sq. ft.
Heating surface of tubes	2,133.15 sq. ft.	2,345.73 sq. ft.
Heating surface, total	2,312.95 sq. ft.	2,529.73 sq. ft.
Grate area	33 sq. ft.	33 sq. ft.
Driving wheels, diameter	73 in.	65 in.
Truck wheels, diameter	33 in.	30 in.
Truck wheels	McKee-Fuller, spoke center	McKee-Fuller, spoke center
Journals driving axles	8½ in. diam. x 12 in. long	8½ in. diam. x 12 in. long.
Journal truck axles	5½ in. diam. x 10 in. long	5½ in. diameter x 10 in. long
Main crank pins, coupling	8¾ in. diam. 5 in. long	Coupling 7 in. diam., 5 in. long.
Main crank pins, main rod	6 in. diam. 6 in. long	Main rod, 6½ in. diam., 6 in. long
Crank pins, front and back	5½ in. diam. 4 in. long	5½ in. diam. x 3¾ in. long
Crank pin material	Coffin process steel	Coffin process toughened steel
Piston rod material	Coffin process steel	Coffin process steel
Piston rod	3½ in. diameter	3¾ in. diam.
Main rod	120 in. long	120 in. long.
Steam ports	1⅝ in. x 18 in. long	1⅝ in. x 19 in. long
Exhaust ports	3 in. x 18 in. long	3 in. x 19 in. long
Bridges	1¼ in.	1¼ in.
Valve outside lap	1 in.	1 in.
Valve inside clearance or lap	Line and line.	Line and line
Valve travel	6 in.	6 in.
Boiler	Extended wagon top	Extended wagon top.
Boiler pressure	200 lbs.	200 lbs.
Boiler diameter of barrel	62 in.	64 in.
Boiler thickness of sheets	½ in. 9-16 in., ⅝ in. and throat 11-16.	½ in., 9-16 in., ⅝ in., throat 11-16 in.
Boiler tube sheets	Front ½ in., back ½ in.	Front ½ in., back ½ in.
Fire-box crown	½ in. sides and back ⅜ in.	½ in. sides, and back ⅜ in.
Fire-box length	112⅛ in.	112⅛ in.
Fire-box width	41¼ in.	41¼ in.
Fire-box depth	Front 70¾ in., back 59¾ in.	73¼ in. front, 62¼ in. back
Fire-box water space	Front 4 in., back and side 3½ in.	Front 4 in., back and sides 3½ in.
Tubes, number of	291-2 in. O. D.	320-2 in O. D.
Length of tubes over tube sheet	14 ft.	14 ft.
Outside diameter of smoke box	65 in.	67 in.
Smokestack	Cast-iron, 44 in. high	Cast-iron 44 in. high
Exhaust nozzle	5¾ in. diam., variable	5¾ in. diam., variable

The Railroads and the Courts in Texas.

"Anti-Railroad Personal Injury Litigation in Texas" is the title of a paper read recently before the Texas Bar Association by Mr. Edwin B. Parker, of Houston, and published in the *Galveston News*; and from the mass of facts and opinion presented by the speaker it would appear that the attitude of the people of Texas, as represented in juries, and even the attitude of the courts themselves, must be regarded as extraordinary. Mr. Parker is a railroad lawyer, apparently, but he states his facts with an evident aim to be fair, and the reader is forced to agree that juries which are "agin" the corporation (which indeed may be found in many states) are particularly numerous and aggressive in Texas.

Mr. Parker begins with a statement of the number of railroad suits which have come before the courts during the past 19 years. From 1881 to 1899, inclusive, 1,283 personal injury suits were brought against the railroads in the Texas Supreme and Appellate Courts, on appeal; and only 154 of these were appealed by the plaintiffs. During the same time only 139 such suits were brought against all persons and corporations other than steam and street railroads. Of this last number 49 were appealed by the plaintiffs and 90 by the defendants. For the year 1899 the Missouri, Kansas & Texas, of Texas, paid out, on account of personal injuries, $218 per mile of road; the Houston & Texas Central, $102; the Southern Pacific in Texas, $96; the San Antonio & Aransas Pass, $70; the International & Great Northern, $60; the Houston East & West Texas, $51, and the Gulf, Colorado & Santa Fe, $37; while in comparison with these large figures the Atchison, Topeka & Santa Fe (whole system) paid only $4; the Chicago, Rock Island & Pacific, $6; the Missouri Pacific, $10; the Wabash $13, and the Union Pacific $16. Those companies which operate lines both in and out of Texas, the Santa Fe, for example, report that their policy in settling cases is not different in that state from what it is elsewhere. The physical condition of railroads and the manner of doing work cannot be greatly different in Texas, as the statistics of accidents to employees show fewer killed, proportionately, in group 9 (which includes Texas) than in the groups which contain the non-Texas roads mentioned.

After explaining that in former years some Texas railroads, and especially receivers in control of roads, pursued an unwise policy in contesting claims too strenuously, Mr. Parker takes up the question of the influence of the Legislature in the matter. In 1891 the common-law fellow-servant rule was abrogated, and supplementary acts were passed in 1893 and 1897. The action of the Legislature was so radical that the courts hesitated to sustain it, but the statutes have finally been settled and Mr. Parker asserts that they unjustly discriminate against railroads. A railroad is an absolute insurer, as to trainmen, of the competency and care exercised by their fellow employees. If other industries were made to conform to the rule applied to railroads a great outcry would at once be heard.

But the Legislature, not content with creating new liabilities and multiplying suits against the railroads, has made it difficult for railroads to compromise; and shyster lawyers get hold of claimants, and make contracts to prosecute a suit for 50 per cent. of the proceeds, before a railroad's lawyer can decently reach the aggrieved party. Mr. Parker finds widows of railroad employees who have been killed denying that they have engaged a certain lawyer, when the lawyer exhibits a written contract signed by the woman; the assumption is that the contract was obtained by deception. Where a claimant is willing to compromise on a reasonable sum, frequently his lawyer induces him not to compromise, and cases are cited where a person who might have got damages by compromise has lost his case in court.

Again, the Legislature puts a premium on speculative suits by requiring no deposit for costs, where a plaintiff swears that he is unable to make a deposit; this allows the prosecution of suits which have no merit.

The Texas courts have no strict rules of pleading and practice, so that the merest tyro can prepare a petition and begin suit; when the petition is shown to be defective he changes front and thus wastes the time of the court and of reputable lawyers. In suits between private individuals either party can compel his adversary to disclose his case, to a certain extent, and thus prevent a change of front; but in 1897 the Legislature passed a law denying this right to corporations. Trial judges are severely limited in charging juries. The court must not sum up a case and must give the charge in very abstract terms; and the average juror gets no benefit from the charge. A trial judge ought to be allowed to submit cases to the jury on special issues, and when necessary require the jury to categorically answer questions on these issues. In a case tried in May, 1899, the Supreme Court decided that the trial judge ought to submit a case on special issues when either party requested him to do so, but in four days after this decision the Legislature passed a bill giving trial judges the option of submitting a case to the jury on either the general issue or special issues.

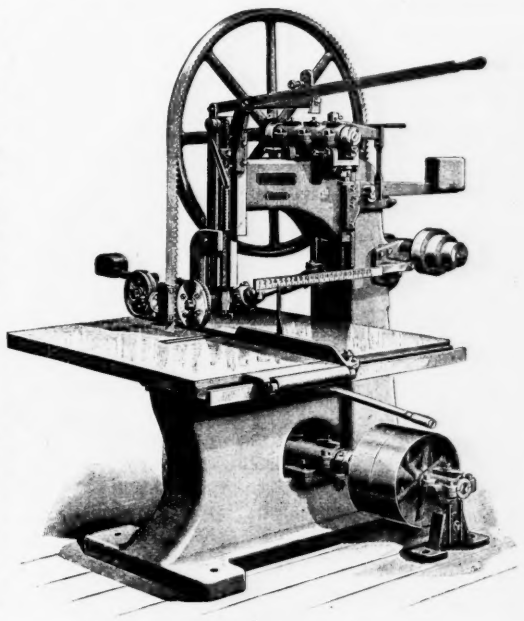
Lawyers who make a specialty of anti-railroad legislation can select a county where juries are favorable, and concentrate their business in such counties. The statute relating to change of venue was changed in 1893, so that it is now difficult for a defendant, especially a railroad, to procure such change; and when more difficult this is the more will the average elective judge yield to prejudice and refuse to make a change.

The courts as well as the Legislature are responsible for the unfair treatment suffered by the railroads. A rule established by the Supreme Court requires cases to be submitted to the jury in all cases where there is an issue of fact, however slight the evidence; and this even in a case where the judge is satisfied that he would at once set aside a verdict in favor of the plaintiff. The reasonable rule would be that approved by the United States Supreme Court, under which the judge, if satisfied that the evidence is wholly insufficient to sustain the plaintiff's case, may dismiss the suit without giving it to the jury. A judge should not shirk his duty in this matter on the assumption that the higher court will correct any injustice which may result, as appellate courts pay great deference to the judgment of the lower court. Verdicts confessedly induced by prejudice, and excessive in amount, are allowed to pass unchallenged on the theory that they can be purged by a remittitur. This is unjust because the prejudice of the jury permeates the entire verdict and not alone the matter of damages. The selection of juries in Texas is very unfair. Commisisoners are appointed by the judge and they are to select the jurors; but the commissioners are often local politicians and they frequently select professional jurors. Their work is done hurriedly and nearly always it is found that a large proportion of the men selected are disqualified or exempt; then the sheriff summons talesmen, and here again there is a harvest of professional jurors. In many cases these men have their minds made up against the railroad before the case is begun, and the trial is a farce. Even where a jury is fairly selected there is usually some prejudice against railroad companies.

Mr. Parker closes with a strong setting forth of the duty of lawyers, who are officers of the court, advisers of the judge and promoters and moulders of public opinion. He censures the railroads for not making more effort to enlighten the public, and correct popular misconceptions concerning the methods of railroad managers.

The Egan Self Feed Band Rip Saw.

The Egan Co., 202-222 West Front street, Cincinnati, Ohio, have just put on sale a new band rip saw, patents for which were granted Feb. 27, and Oct. 2, 1900. It is said that this machine will do much more work than a circular saw requiring the same floor space, and that it is much safer to operate. With this type of saw the danger of wood being kicked back, and thus injuring the workman, is avoided. It will rip from 1 to 9 in. thick with equal facility and without changing blades, and its adjustments are made very rapidly. The thinness of the saw blade and the slight kerf removed will be readily appreciated by users of fine lumber. The column is very heavy, cored, and perfectly free from vibration. The table is of ample size, always level, and has a plainly stamped index always in view and not liable to be obscured by sawdust. The knife edge balance on this machine is used in connection with the straining device, insuring a perfect tension on the saw blade. This is one of the most important features on a band saw, as it prolongs the life of the blade and avoids the expense and inconvenience of substituting a new one. The feed is very powerful, and the feeding-in and feeding-out rolls are placed close together, so that short stock can be worked to the very best advantage. For establishments where flooring and narrow stuff is made in large quantities this machine can be fitted with "live rolls," which will return the material to the operator for another cut, making a valuable labor-saving tool. The manufacturers will furnish prices and full particulars on application.



A New Band Rip Saw.

The beginning of work on a railroad in Greece is the result of the English conquest of the South African republics. This seems a non-sequitur, but the way of it is this: Last April an English and French syndicate made a contract with the Greek government, according to which the syndicate agreed to begin work on a railroad from Athens to Larissa, "three months after the final cessation of the condition of war between England and the South African republics," believing doubtless that it would not be easy to raise money while the war lasted. When the British government announced that it had annexed the republics, the Greek authorities declared that it should hold this to be the date of the close of the war, and bade the syndicate to begin work within three months accordingly.

RAILROAD GAZETTE

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EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

In our issue of September 14, a description of the Mallet articulated compound locomotive was supplemented by a brief editorial discussion, in the course of which we attempted to summarize the advantages and, as it seemed to us, the disadvantages of this well known type of engine. In the course of this discussion we indicated "that the Mallet engine can never in any large sense become a general purpose machine. Its flexible wheel base allows it to pass short curves, and it may be so designed that it would draw heavy loads, but it can only move at low speeds. Its wheels must always be of small diameter," which statement, perhaps, gives undue emphasis to a fact which in its general application, at least, is obviously true. M. Mallet, in a personal letter, takes exceptions to this statement, and we violate no confidence and do but justice to him, in giving an abstract of this letter. M. Mallet writes: "I am surprised to see in the editorial column of the *Railroad Gazette* a statement to the effect that 'the Mallet articulated Compound engine (the Mallet compound) can only move at low speed; that the wheels must always be of a small diameter.' I am unable to find any reason to such a statement. The Central Swiss Railroad engines are allowed to run at a maximum speed of 34 miles an hour, with 47¼ inch wheels. The Bavarian engine of the Paris Exhibition has 53 inch wheels; it will run at 38 miles. There is no difficulty to make wheels of 5 feet and run at corresponding speeds, practically the same as consolidation engines. Consequently I think my engine is entitled to be classed with the freight engines employed in general use on the American roads. As a passenger engine it has made a pretty good service on the Paris Exhibition Railroad in 1889, of which it has totally conducted the work."

The Absorption of the Boston & Albany by the New York Central.

The stockholders of the New York Central are to meet next week to ratify the action of their directors in taking a lease of the Boston & Albany for 99 years. This is the final act in the negotiations which were begun more than a year ago, but which have been prolonged by the slowness of the Massachusetts legislature in making up its mind to approve the lease. The discussions in that body continued until after the time at which the lease was intended to go into effect, so that the public has been at sea as to what would be the precise effect of the approval which at last was given; but the understanding between the companies now provides that the papers when finally delivered shall make the transfer as of the date originally contemplated, July 1, 1900; so that observers who have been expecting to see a visible change will find that they have crossed the line without knowing it, like voyagers who forget to look, at the right moment, for the equator. And as far as can be learned from the officers of either company the outward things—the names to be used, the organization of officers and the methods of doing business—are to remain as they are indefinitely. It would appear that the Central does not intend to disturb the Boston & Albany any more than it did the purchased Lake Shore & Michigan Southern; though, of course, the executive officers of the B. & A. will have to perform their duties as agents of the N. Y. C., whereas those of the Lake Shore keep their titles unchanged in form, the N. Y. C. holding precisely the same relation to them as did their former stockholders.

The lease, as finally approved by the Massachusetts legislature, shows no radical change except the provision that $250,000 a year, for 10 years, from the earnings or other resources of the B. & A., shall be spent on the East Boston branch. As that branch needs some double track and other improvements and as the grain shipping facilities at the terminus need enlargement it does not appear that this stipulation is unreasonable in amount. At any rate the roads made no strenuous objection to it. At the same time, the action of the legislature gives this whole feature the air of a "hold-up." The people of Boston who feared that the importance of their city as an exporter of grain was in danger, felt bound to get something out of the railroad as the price of their approval, and fastened upon the most available point within their reach.

The legislature requires the business and earnings of the B. & A. to be reported separate from those of the N. Y. C.; but that would be done in any event. It reserves the right to reduce rates, compel service, etc., but that would have gone without saying. The clause of the law requiring export and import rates to be as low as through New York city has a proviso that if it conflicts with any regulations made by Congress it shall be null and void so far as it thus conflicts. The Central must not diminish facilities or permit the standard of service to be lowered . . . "as shown in the quality and equipment of cars, construction and care of stations, station grounds and approaches, and provisions for the security and convenience of the public." This last clause has a distinctly Bostonian flavor. If the chief gardener should conclude to plant dandelions and daisies instead of hydrangea paniculata grandiflora on the grounds of the station at Waban or Auburndale Mere he would probably have the Sergeant at Arms of the Great and General Court after him mighty quick.

The discussion in and out of the legislature over the probable results of the lease brought out nothing that was not known before. The New York Central people averred that they simply wanted to make permanent their present favorable arrangements for New England business, with no desire to use Massachusetts profits for expenditures in New York or elsewhere; and there is nothing to indicate that this is other than a frank statement. The opponents of the lease had much to say about State ownership, but the sentiment of the public of Massachusetts appears to be very strongly the other way. There was not at any time any evidence that the proposition for the State to buy or take the Boston & Albany would be approved by any important element in the legislature.

The Central will have every incentive to keep the standard of service on the B. & A. as high as it has been; and the people of Massachusetts would, no doubt, speak their minds very freely if it should fail to do so. As far as handsome stations and cars are concerned the Central has shown by its recent action on its own road that its desires and tastes are as high as any one could ask; though it is still far behind the B. & A. in the number of stations improved. In speed and frequency of trains the Central has been regarded by most people as considerably in advance of the B. & A. As to profits and the use to be made of them, it is to be remembered that this is an element in which the personal equation is an important factor. The questions which the public most desire to see answered cannot yet be answered even by the officers who will have to deal with them. But the most important point for the comfort of the doubtful Provincials is that the immediate management of their pet railroad is to remain in substantially the same hands that have managed the road in the past.

It will be remembered that to meet the wishes of the legislature the term of the lease was reduced from 999 years to 99. This change appears to have been made as promptly and willingly as the picture-merchant took off one cipher from the price of a $5,000 oil painting which the prospective customer thought he could not quite afford to buy. The term of the lease has been discussed somewhat since the legislature adjourned, the Speaker of the House saying that it ought to have been reduced to 33 years. As we have before intimated, questions of what will be desired or what will be best for either party 100 years, or even 20 years, in the future are at best very dim and vague; but it seems to us that the criticisms based on the Speaker's view are really answered by the fact that, as every one knows, long railroad leases are generally equivalent to a sale. The parties most immediately interested, the lessor and the lessee, would see to it that the conditions were properly stipulated, if this were not the case. The Boston & Albany directors would never have leased their property to the Central had they not been ready to accept a complete merger, in due course. Long before the lease expires, the two companies will be practically one, and the term of the lease might just as well be 3,300 years as 33. As for the State, "the third party to the lease," its interests are the same, whether the owners of the road live in Boston or in Buffalo; and its power to enforce its rights is the same.

Siberian Competition.

The building of the Siberian Railroad leads to the consideration of the effect on other countries which may be caused by giving the productions of a country so enormous access to the populous parts of Europe, from which it has been almost cut off heretofore. A thorough consideration of the subject would demand a knowledge not only of the extent of the country thus connected with the world's markets, but of the capacity for production of its different parts. A single line of railroad through a country more than 1,500 miles wide will not give an outlet for all parts of it any more than the Union Pacific opened a way for the traffic of Texas and Arizona, of Dakota and Montana, as well as of Nebraska and Utah. It is true, however, that the Asiatic railroad is enabled to serve a much wider territory than any one American transcontinental line by the thousands of miles of navigable river channels which it crosses, and on which, perhaps, there is more fertile land than immediately along the whole 4,000 miles of the railroad, if we except the Chinese section of it.

But without any consideration of physical geography or statistics, there is one rough test which is of great import: there are very few people in that vast territory, and if it is not very much below other countries of the old world in productivity, that fact is hard to explain. Substantially all parts of Europe and Asia, where the land is fairly fertile, became populous long before they had any commerce of importance with other parts. Asia has swarmed repeatedly and its surplus population has forced its way, or attempted to do so, almost everywhere in Europe or Asia where it could find subsistence, but Siberia has never had a considerable population.

It does not follow that it is not capable of maintaining a population many times as great as it now possesses. European Russia, in 1897, with an area of about 2,100,000 square miles, had 106,000,000 inhabitants; Siberia, with more than double the area, only 5,700,000. The latter territory might have only one-tenth the productivity of Russia and yet support more than 20,000,000 people. The case is something like that of the territory in this country between the 100th meridian and the Sierra Nevada: compared with the agricultural country further east, it is, as a whole, extremely infertile, but given an outlet to market, such resources as it has were rapidly developed and have become, in the aggregate, very important; aside from mines, the range cattle industry is a striking example.

In the following account of Siberian conditions, we are indebted for many of the facts to a series of scholarly articles in the "Archiv für Eisenbahnwesen" by Dr. Kurt Widenfeld.

Siberia has for a considerable distance immediately off the European border in the aggregate a large amount of land capable of growing grain, and has long produced wheat, rye and oats. The rainfall is usually lighter than in Russia, but in most years sufficient, and wheat is produced in latitudes where in Russia only rye is grown. This part of Siberia has had the railroad now several years, and it has had its river steamboat lines much longer, though these were not of much use for the export of grain, but only for its distribution in Western Siberia itself, where there are some old mining enterprises. Now the grain production of Siberia in 1896 was reported to be 28,000,000 bushels wheat, 16,000,000 rye, 44,000,000 oats, and 4,000,000 barley, which is comparable with the production of a single one of our smaller Western States, and is an insignificant addition to the production of European Russia, which in that year was 320,000,000 bushels wheat, 788,000,000 rye, etc. Further, the Siberian production showed no tendency to increase down to that time, but was less in 1896 than in 1893.

The Siberian Railroad was not the first to give an outlet to Siberian grain. As early as 1886 a railroad was completed further north from Perm, the head of navigation on a branch of the Volga, over the Ural Mountains to Tjumen, on the Obi, accessible by steamboats from long stretches of river. This was not designed as a route for grain, but in 1891, at the time of the famine, which was worst on the European side of the Ural, some 3,500,000 bushels were shipped over that route. Since the opening of the Siberian Railroad, which crosses the

best wheat lands as well as the rivers, the Siberian exports have been much larger, over that road alone being 9,000,000 bushels in 1897 and 12,000,000 in 1898, besides what went over the old route, in all possibly 20,000,000 bushels.

These are the early days of the industry, but that those most familiar with the circumstances do not expect a very great development of grain production is indicated by the fact that the commission which reported in favor of improving the Siberian Railroad so as to greatly increase its capacity for traffic, in its estimates of the business to be expected made allowance for only 30,000,000 bushels of wheat. This is too small a quantity to have any appreciable effect on the world's markets. Very likely it is very much less than Siberia's capacity for grain production. Russia itself does not favor a great export grain traffic from Siberia. Raising grain for export is the chief industry of the Russians, and they have no desire to cultivate competitors to underbid them. The Russian freight tariff applied to the Siberian Railroad would make the rates over the Siberian Railroad for a shipment across Russia extremely low. By this tariff the rate is 50 kopeks per carload of 27,000 lbs. per verst for the first 180 versts, 12 for the next 140 versts, 11 for the next 480 versts, 9 for the next 320 versts, and then for further distances above 1,120 versts (750 miles), 6½ kopeks per verst, which is just about 5 cents per car mile, or 0.37 cent per ton per mile. From the crossing of the river Irtysh to the Baltic the distance is 3,589 versts, so that by the regular tariff grain would pay 0.37 cent per ton-mile for 2,469 versts. But the tariff is applied to the 746 versts of the Siberian Railroad as though its western terminus were the final destination, and the shipper pays $60.60 per car for that part of the transportation, which would cost him but $25 were the Siberian Railroad reckoned a part of the Russian system. For the more eastern points on this railroad the differences are still greater, but from the Irtysh to Reval, on the Baltic, the freight on wheat is $196.80 per carload, equal to 73 cents per 100 lbs., or 44 cents per bushel, a not immoderate charge for a distance of nearly 2,400 miles; but one which makes competition with more favorably situated countries impossible, except in times of scarcity and high prices. Even from India the freight to England is but 12 cents a bushel in years of high freights, and a third less in years of low freights, and when the Siberian wheat gets to Reval it still has ocean freight to pay.

Further evidence of the purpose to keep Siberian grain out of Russia is the establishment of a route through Archangel, which we have described before. By this route shipments from the line of the Siberian Railroad leave it at its western terminus by a railroad on the Siberian side of the Urals, and are carried over the mountains by the old Ural Railroad and then northwestward from Perm over a new railroad to the Dwina River at Kotlas, then are towed down the river in barges to Archangel, where about five months of the year a steamer line carries them to Hamburg. A contract is made with the steamer line and the grain is consigned through on one bill of lading at fixed rates, which, however, amount to 36 cents per bushel, besides the freight, varying with distance, over the Siberian Railroad. The line, however, has connection with the river system of the Obi and the Irtysh at a point (Tjumen) more central for the steamboats, some 125 miles north of the Siberian Railroad. To encourage shipments over this route an office in Archangel makes advances on consignments, and elevators of considerable storage capacity are provided where the rail shipments are transferred to the river barges, as these can run only five months in the year. This is a material disadvantage of the route as a grain carrier, for though five months is abundance of time for carrying all possible Siberian exports, unfortunately not much more than one month or six weeks of the period of navigation comes after harvest and threshing, which in these high latitudes must be late.* Other disadvantages of the route may be removed by improvements of the river and the harbor of Archangel, but in this particular no improvement seems possible.

By making the Siberian grain take this route it is kept from competing with Russian grain in the Russian markets, and this seems to be considered important; though in ordinary years when Russia itself has a great surplus for export the prices in the home markets must be determined by the foreign demand, as much as they are in Cincinnati and Philadelphia. But one decided advantage is gained by using the new route under existing circumstances and that is the relief of the existing railroad which gives outlet through Russia to the Siberian Railroad, which, more than once, has been completely blocked with traffic for weeks, though its business is not what we should call heavy, and it can be doubtless be improved so as to carry several times its present traffic. The rail distance by the Archangel line is 1,000 miles from the Western terminus of the Siberian Railroad, and about 50 miles further from the steamboat station at Tjumen.

It appears from this that Siberia is not likely to become a serious competitor for the supply of grain to Western European markets. The distances are too great.

It is different with live stock, as American experience has shown. Cattle can be made their own carriers for very considerable distances. It is but a short time since nearly all Texas cattle marketed were driven north to the Kansas Pacific and in considerable numbers to the Union Pacific; and a single railroad through Siberia may serve as an outlet for most of the grazing lands throughout its wide extent, especially in connection with the great river system. And cattle have long been the chief support of the scattered population, consisting largely of nomadic tribes. Before the building of the railroad it was estimated that there were 5,000,000 horses, 4,500,000 cattle and 15,000,000 sheep and goats in Asiatic Russia. The Kirgis steppe in the southwest, which had 1,800,000 horses, 1,000,000 cattle and 10,400,000 sheep and goats, can perhaps find an outlet to the Caspian and the Volga easier than to the railroad, which is far to the north; but the country further north ought to be capable of a great extension of its live stock industry and to be able to market its cattle and their products at much less cost than grain. And a beginning has been made which in some respects is surprising. The construction of the railroad has been accompanied by the establishment of creameries at the stations and in their vicinity, by private enterprise. At the beginning of this year there were more than 250 of them, making butter by modern processes, and shipping it not only to Russian cities but as far as London, encouraged by a through rate which amounts to only 1.6 cents per pound from Omsk to London (or Hamburg), though the rail distance to the Baltic is no less than 2,390 miles. Butter, naturally, can bear a much higher freight than wheat. The Siberian butter is used to a considerable extent as cooking butter in Germany and has driven the butter of Finland largely out of the Russian market and turned it to the other European markets. A "butter train" of 20 to 25 refrigerator cars is despatched once a week in the summer, which covers the distance from the Obi to the Baltic (Reval) in ten days. Evidently, where dairies are possible, there may be production of beef, wool and hides, and doubtless a vast increase in their export, which will make itself felt to some extent in the rest of the world.

In a country of such vast extent there will doubtless be discoveries and developments as yet unforeseen, and the mining industries of Siberia—many of them very old—are likely to be greatly benefited by their ability to bring in machinery; but there is little probability that any such developments are likely to affect to any great extent the industries of this country or of Western Europe.

*Since the above was written, statistics of grain exports from the line of the Siberian Railroad for each month of the last half of 1899 have appeared, showing none in August, 40 in September, 352 in October, 99 in November, and 391 in December.

The interesting and complete installation of automatic block signals now being put up by the Union Switch & Signal Company on the Morris & Essex division of the Delaware, Lackawanna & Western was described in the *Railroad Gazette* of August 10. A part of these signals are now in use, and all of the signals, old and new, on that division of the road, are now equipped to show green for the night all-clear indication. Horizontal distant signal arms will show a yellow light. Where there is a diverging high-speed route the lower semaphore arm is placed 12 ft. below the upper arm, so as to make a distinction between a signal of this kind and the two-arm signal at the entrance to an automatic block section (in which the lower arm is a distant signal.) For ordinary diverging routes, such as side tracks and cross-overs a one-arm high signal is used, with a one-arm dwarf set close to the base of the high post. In either case—high speed or low speed—the semaphore for the diverging route will, when horizontal, show no light whatever, so that enginemen proceeding on the main line at night will see only one light at such places. The changes necessary to introduce these principles on other divisions of the road are being rapidly carried out. The switch lights on the Lackawanna already show green lights when set for the main track. Automatic disk signals on or close to semaphores (at interlocking plants) are being taken down and supplanted by electric slots on the semaphores, making these semi-automatic.

We have learned, quite by accident, that mention has been made of the name of Mr. A. M. Waitt as President of the American Society of Mechanical Engineers. The annual meeting is held the first Tuesday in November and nominations must be sent to the Secretary at least 30 days before that meeting; so that the friends of Mr. Waitt must be brisk. We are writing without any knowledge of what has been done in the matter or of Mr. Waitt's willingness or unwillingness to accept the office; but we should not doubt that he would accept it if his busy life permits. Of his fitness and of the value of his presidency to the Society we need not say a word. It would please a great number of active and able men—young and youngish—to have so excellent a representative of railroad mechanical engineering at the head of the society; and it would give to the meetings and published papers a new stimulus and a diversity which, to say the least, would do no harm. We hope the suggestion is not too late; but there are other years coming.

As heretofore noted in the *Railroad Gazette*, a pension department, like that which has existed on the Pennsylvania Railroad since the beginning of the present year, is to be established on the Pennsylvania Lines West of Pittsburgh. The Secretary of the Board of pension officers on the Western lines will be Mr. S. H. Church, Assistant Secretary of the Pennsylvania Company, and the regulations will go into effect on the first of next January. The number of employees affected by the new regulations is about 35,000. About 15,000 of these are members of the Relief Fund, but there will be no annuity from the Relief Fund for pensioners, as on the Eastern lines, for the reason that the Relief Fund on the Western lines has not yet accumulated a large surplus. The age for retirement and other regulations will be the same as on the Eastern lines, the age of the compulsory retirement being 70 years. It is said that the number of persons to be entered on the pension list at the beginning of 1901 will be about 300.

NEW PUBLICATIONS.

The Chemistry of the Materials of Engineering.—A Handbook for Engineering Students. By A. Humbolt Sexton, Professor of Metallurgy in the Glasgow and West of Scotland Technical College. 12 mo., cloth, pp. 332; 34 engravings; no index. Manchester: The Technical Publishing Co., Limited. 1900.

In his preface the author says that in his lectures to engineering students on the Materials of Engineering he has felt the need of a suitable text-book, and that this little book has been prepared to meet that need. He hopes that it may be useful as an introduction to the larger books on the subject. This suggests at once the plan and scope and limits of the book. It is a compact hand-book, telling elementary facts about the metals, alloys and other materials used in engineering construction. Obviously in a volume so small the matter covering a subject so vast must be condensed to the last degree and must be confined to the fundamentals. This is the more true in that the treatment is not strictly confined to the chemistry of the materials but covers the metallurgy of iron and steel and other metals, the micro-structure of steel and the physical properties of the materials of engineering in general, even lubricants, paints and varnishes being considered. Thus it is not only a useful hand-book for the beginner but a convenient book of reference for the engineer and the general reader.

Poor's Manual of the Railroads of the United States. Twenty-third annual number, 1900. With an appendix containing a full analysis of the debts of the United States, the several states, municipalities, etc., also statements of street railway and traction companies, industrial corporations, etc. New York: H. V. & H. W. Poor. $10.

One of the important events of the railroad year is the appearance of Poor's Manual, which has not been displaced or superseded in any way by the statistical annuals of the national or state governments. The Manual for this year, bringing information down to the end of the calendar year 1899, is an octavo of 1,536 pages, to say nothing of the advertisements, which pages are also useful.

In our issue of Sept. 28, page 639, appeared some facts taken from this issue of the Manual giving certain general statistics of railroads, traffic and traffic results. In that short review we mentioned also the "Study in Railway Statistics," which Mr. Meany has this year incorporated in the introduction and which is an interesting and useful chapter involving an immense amount of work. Railroad building in the United States is reviewed and figures are given of railroad built in various regions and various periods. Another division of this study gives important statistics of trunk line railroads from 1870 to 1898, giving mileage, capitalization and traffic statistics and statistics of financial results. Another division treats of capitalization and the return thereon, and still another is an elaborate review of the financial history of the railroads of the country, giving many statistics. Then receiverships and foreclosures are taken up, which naturally includes a review of reorganizations.

An important new feature (thought by the editor to be the most important feature introduced into the Manual in recent years) is a ready reference bond list of leading steam railroads. This describes the bonds as to date of issue and maturity, amount, etc., and gives the dates when interest is payable, very conveniently arranged. One can run down the column and ascertain at once all railroad coupons falling due on the first of January or July or at other periods. This table gives not only the amount outstanding of each issue of bonds, but the interest rate and the annual charge, also the amount outstanding per mile of railroad. It fills 85 pages of the volume.

Of course the reader who has occasion to know much about railroads in general or in particular is aware of the fact that the bulk of Poor's Manual is made up of a synopsis of the history and condition of individual railroads, this being for most people much the most valuable part of the publication and being a particular in which it is unique, both in ground covered and in the completeness with which that ground is covered. The department of street railroads has, however, grown to considerable magnitude and this year it fills 200 pages, giving particulars of street railroads arranged alphabetically by states and including the Dominion of Canada. The space assigned to miscellaneous industrial corporations is 84 pages and that assigned to state and municipal debts is 131 pages. The volume contains finally a convenient directory of railroad officers arranged alphabetically by companies.

TRADE CATALOGUES.

Electric Locomotives for Light Railroads.—The C. W. Hunt Company, 45 Broadway, New York City, issue a

very interesting little circular describing the electric locomotive brought out by them for use in shops and on narrow gage industrial railroads. It is a storage battery machine, the motors, batteries and all the rigging being mounted above the car floor instead of below. This is obviously almost necessary for a narrow gage machine, and is certainly convenient. One of the peculiarities of this class of locomotive for this special service is that the weight of the battery is really advantageous as giving great adhesion, while all of the hauls are short and the speeds low. Consequently, the cost of hauling heavy storage batteries around the country does not enter as in the case of roads working long hauls at high speeds. This has permitted the C. W. Hunt Company to employ unusually large and heavy battery plates which need not be overworked, thus insuring durability and efficiency equal to that found in stationary work. While batteries for automobiles are usually required to deliver about seven watts per pound of lead the Hunt batteries are called upon for only one or two watts per pound. Furthermore, no rheostats or resistances are used on these locomotives; the motors are so proportioned to the normal output and to the weight of the locomotive that they cannot be overloaded, but work at maximum efficiency. These locomotives run around a curve of 12 ft. radius, the gage being 21½ in., although of course the company is prepared to build to other gages. The purchaser is especially warned that storage battery locomotives are not suitable for long hauls or heavy grades, but are suitable for yard and intermittent work. It is said that to recharge the batteries requires about one-quarter as much time as the locomotive is in actual work.

Steel Castings.—The American Steel Casting Co., Chester, Pa., (branch offices, Fisher Building, Chicago; New England Building, Cleveland; 26th street and Allegheny Valley Railroad, Pittsburgh), issues a pamphlet describing, with illustrations, some of its open-hearth steel castings. Of course the reader is familiar with the work done by this company. The pamphlet shows engravings of castings of great size, as, for instance, a bed plate weighing 30,000 lbs., a hydraulic cylinder weighing 31,000 lbs., a stern post weighing 50,000 lbs., a ram for a battleship weighing 43,000 lbs., etc. But the company also makes a variety of small castings. In steam railroad matters the pamphlet shows and describes driving wheel centers, locomotive frames, side-rods, the Keystone cast-steel bolster, the American all-steel M. C. B. coupler, etc. The company issues a special pamphlet describing the Keystone bolster for freight cars and locomotive tenders. These bolsters are shown by photographs, assembled complete and in cross section. Each bolster is tested as to carrying capacity and rigidity up to 200,000 lbs.

Machine Tools.—Messrs. Manning, Maxwell & Moore, 85, 87 and 89 Liberty street, New York City, send us their 1901 catalogue of machine tools and attachments. This is a large quarto volume of 704 pages, well printed and substantially bound. An index of six pages makes the volume readily available for the purchaser, and we might also say for the student because the immense variety of machine tools shown and described will bring the investigator right up to the present state of the art. This concern has found it necessary to issue two catalogues, one of which, the one now out, shows metal and woodworking machine tools. Another one of 800 pages will show railroad, steamship, machinists' and contractors' tools and supplies. The illustrations are designated by figure numbers for convenience in transmitting orders, and the catalogue contains also telegraphic and cable codes. The house has a store in Chicago, 22-26 South Canal street; an office in Pittsburgh, Park Building, and one in Cleveland, Williamson Building.

Instruments and Drawing Materials.—Messrs. Keuffel & Esser, of New York City, have issued their catalogue of drawing materials, mathematical and surveying instruments for 1900 and 1901. It is an octavo volume of 482 pages with a good index and covers a long list of instruments and material, all of which are adequately illustrated and described. The changes from the last edition are mostly in additional matter. The descriptive matter has been made somewhat more complete, better cuts have been used and the index has been carefully revised. Slide rules, planimeters and pantographs are shown in greater variety than ever. Meters and gages for hydraulic work, also barometers and the like are now listed and there is a new list of sextants and octants.

Coupler Attachments.—The Thornburg Coupler Attachments Co., Ltd., of Detroit, send a pamphlet which contains pictures and short descriptions of the coupler attachments made by that concern. These are malleable iron; for all classes of equipment, either with single, double or triple springs and with or without metal draft beams. Many of the engravings are from photographs showing the attachments assembled and in detail, and they are admirably printed. Good line drawings are also given. The same pamphlet shows draft arms for single, triple or twin springs and box followers. These attachments are in use on over 70 railroads and private car lines and over 25,000 sets are in service.

Springs.—The American Steel & Wire Company, Washburn & Moen Department, Worcester, Mass., issues catalogue No. 4, being especially devoted to springs. It is a pamphlet of 60 pages showing, and briefly describing, the great variety of springs made by this concern. There are tables showing gage, number and decimal equivalents for seven different gages, also giving the American Steel & Wire Company's wire gage and intermediate sizes of wire with decimals and metric equivalents, sectional area and weights. Another table gives decimal and millimeter equivalents of fractions of an inch.

Asbestos Roofing.—The H. W. Johns Mfg. Co., 100 William street, New York City, has issued a little pamphlet made up entirely of letters from those who have used asbestos roofing, with half-tone pictures of buildings so covered. The letters are all of recent date, but the periods covered extend over many years.

Machine Tools.—The Hilles & Jones Co., Wilmington, Del., sends a new catalogue of machine tools for working plates, bars and structural shapes. The catalogue covers a great range of tools of large capacity and heavy power.

Double Truck Cars—How to Equip Them to Obtain Maximum Efficiency Under Varying Conditions.*

Trucks.

The double truck for use on street railways has not received the attention it merits. The 55 years' experience of the steam railroads in the development of the double truck now used by them, should be a warrant to the street railway managements in adopting only trucks that conform to the lines used by these roads; the diameter of the wheels, with the tread and depth of flange should be changed only where conditions prevent using the Master Car Builders' standard. I present drawings of a double truck designed along steam railroad lines. In giving a brief description of this truck it will not be necessary to mention the wheels further than to say that they are cast chilled, 33 in. in diam. with a 3-in. tread and 1-in. flange, formed to fit the modern rail, and weigh 380 lbs. The axles are of forged steel, high in carbon, with a 2-in. hole bored through the entire length. The key seat at the gear wheel-fit is cut above the line of motor bearings and journals, in order not to weaken the axle.

The oil boxes are constructed so that the journal brasses may be readily removed, and with dust guard placed in position from the underside of box. An extra guard is placed from the same side and where it will retain the oil at the highest point. The journal brasses and boxes are finished in such a manner as to obtain the full journal bearing under all conditions. The side frames are made from two ⅜-in. steel plates, thus allowing the main equalizer to be supported between the two frames on long helical springs. With this arrangement the bar can be removed for repairs without in any way taking the truck apart. This form of frame allows the greatest freedom of access to all parts, and the use of the extended equalizer bars gives extended spring movement, with a perfect side movement on curves and at low places in the track, minimizing the blow to the car body, rail joints and special work and reducing the cost of maintenance of track and equipment. The side frame is so strongly constructed at points where the transom joins the frame that it is not necessary to continue frame around the end and connect it with the other side of frame to keep the truck in alignment. This also allows the placing of the truck near the end of the car body without coming in contact with the steps. The brakes are placed inside of the wheels, without using a brake-beam. This position insures the most positive action, with either hand or power and independent braking on each wheel. The wheel base, 5 ft. 6 in., allows the motors to be suspended between axles and transoms.

Motors.

The writer, having had experience with heavy and light motors, mounted with two motors on one truck, the other truck being an idle or trail truck, as well as with one motor on each truck, has found that, while greater efficiency is shown with the latter method, the two motors mounted on one truck show a saving in labor, first cost of the trail truck, and cost for maintenance. Maximum efficiency, with minimum cost of maintenance, with both heavy and light motors, has been obtained by mounting two motors on each truck, making a four-motor equipment. With this form of equipment, higher speed and quicker acceleration are obtained with lower power consumption, both in the average and total for the whole trip. The controllers have not, as far as space and weight are concerned, kept pace with the motors. This part of the apparatus should receive the attention of the best talent of our manufacturing companies. The four-motor controllers, in their present form, are large cumbersome affairs, placed in that portion of the car body where they are inconvenient and expensive to support. A more satisfactory controller can be produced by using a small pilot controller placed on the platform, with some developed form of main controller underneath the car body.

Double Truck Cars and Equipment.

From information furnished by the operating department and from personal observation, the writer is led to believe the following dimensions are the most desirable: Length over all 40 to 50 ft.; width over all 7 ft. 6 in. to 8 ft. 8 in.

With the increasing demand from the traveling public for the extension of present systems to suburban districts with a more frequent service and increased speed, also the construction of long interurban lines, the present managements, to meet this demand, are turning to the double truck car constructed along the lines of the steam railroad coach. The drawings show a double truck car, which the writer believes will become justly popular. This car combines the largest number of good features and is so constructed as to admit of placing the electrical equipment where it is accessible and less liable to come into contact with the truck or brake equipment. The car body can be carried at the lowest point and the trucks placed near the end of the body. This car gives the maximum efficiency, durability, speed, safety and seating capacity, attractiveness and ease and comfort to passengers, coupled with the minimum cost of construction and maintenance, and less dead weight per passenger, based on seating capacity. The total weight is made up as follows: Trucks, 3,970 lbs. each; four motors, 2,385 lbs. each; car body and equipment, 12,300 lbs.; a total weight of 29,780 lbs. This amount divided by 63 passengers gives a dead weight of 473 lbs. per passenger. The cars of to-day show a dead weight, based on the seating capacity, of 750 lbs. to 1,100 lbs. per passenger.

Discussion.

Mr. Foster: The Lynn & Boston Railroad Co. is operating lines running into Boston. We operate one line over a distance of 16 miles from a small town on the coast, Marblehead, through Swampscot, Lynn, Revere and Chelsea to Boston. On that line, we are operating 12-bench double-truck open cars, equipped with four motors. The box car equipment is a 25-ft. box car, double truck, with four motors. We have been operating over this line about 15 months. We are running at a maximum speed of 30 miles an hour, and we have found by experience that the operating of four motors is more economical than the operation of two motors over the same line under the same cars and under the same conditions. To be sure, there is an increased consumption of power. We are all willing, I believe, to concede that, and I think Colonel Heft will agree with me, although he shakes his head to the contrary. From tests made, we are sure of it. The operation of four motors, of course, depends upon the speed you wish to attain. In operating upon a line where your speed is more than 12 to 15 miles per hour, I question whether it would be wise to adopt the practice of using four motors. We are also operating on many lines, 16, 18, and 20-ft. cars. With those cars, we operate, as is customary, the usual two motors. We have various types of motors, but we have learned by our experience that the double truck car, with two motors, or four motors, is more desirable and profitable to operate.

Mr. Chamberlain (Brooklyn): I speak more particularly of the construction of a car without longitudinal truss rods. I think that Colonel Heft has designed a car of something over 42 ft. in length, and gains his body support by a number of cross transoms built in the form of the ordinary iron body bolster, welded at the ends, filled in with wood, and supported through the center with longitudinal I beams running from one end of the car to the other. The author of the paper has evidently, by this plan, succeeded in obtaining the minimum of weight with the maximum carrying capacity.

Mr. W. E. Harrington (Camden): There are a large number of roads using four-motor equipments, but there seems to be relatively very little known as to the number of watt-hours per car-mile which the different equipments require. Mr. Foster says it takes more power with the four-motor equipment, and Colonel Heft says it takes less. I know from tests I have made that the doubletruck, 40-ft. car equipment, with two 38-B Westinghouse motors, on maximum traction trucks, have taken an average of 2,000 watt-hours per car mile, whereas, the same weight of car, with the center pivotal truck, with No. 49 Westinghouse motors, 35-h.p., under identically the same conditions, takes an average of only 1,200 watt-hours per car-mile: a single truck car, under similar conditions, an 18-ft. body car, takes an average of 900 watt-hours. I would like to know if there are any data from actual test to show the number of watt-hours consumed by these different equipments.

Mr. Heft: I do not remember the figures, but we have made a series of tests during the last three years with double truck cars, equipped with one, two, and four motors, as I have stated in the paper, and we have kept a very close and accurate record of the results. The weights of the different trains on which these tests were made varied from 15 to 250 tons. The speeds varied from 10 to 65 miles an hour. There is no place where the car is operated with an increase of current with the four-motor equipment, except while accelerating, but you gain a quicker and higher acceleration by this increased consumption of power. The average consumption of the current, however, and even the total consumption of the current, in the running of the cars, is less with the four-motor equipment than with the two-motor equipment. That is beyond dispute. I can furnish data to that effect.

Mr. Wason: I would ask if the additional cost for the drilling of the hole through the axle and the armature shaft is commensurate with the results, and whether he is seeking to lighten the axle, or to be assured of the quality of material?

Mr. Heft: I am willing to admit that the drilling of the

*Extracts from a paper read at the meeting of American Street Railway Association, Oct. 18, by N. H. Heft, president Meriden Electric Railroad Co.

axle is a debatable question. About five years ago, we commenced to use hollow axles on our high-speed motors, and the results have been so favorable in the way of reducing the number of hot boxes, hot journal bearings, and everything of that kind, that we have decided to adopt that form of axle. It decreases the weight about 25 per cent., with a loss of strength, varying according to the size of the axle, of from only 3 to 5 per cent. We have never had any of them break. We had a great deal of trouble with our axles on our heavy high-speed motors, and we found it necessary to increase the diameter and weight of the axles. We were loath to do this, and so we adopted the plan of drilling a hole through the axle to lighten it. We not only lighten the axle, but we get the benefit of having a ventilated axle.

Mr. J. I. Beggs: In connection with the statement that four motors take no more current than two motors. I would ask Colonel Heft whether he meant four motors of the same size, or two motors having the same capacity as the four might have had?

Mr. Heft: We have made experiments with motors of different capacities, but all of the motors were of the same size, and used on the same class of equipment.

Mr. Beggs: I do not know whether I made myself clear. We made some very exhaustive tests, and they were so opposed to the position which Colonel Heft now takes, that I took occasion to have Mr. B. E. Sunny, the western manager of the General Electric Co., and also Mr. Theodore P. Bailey, the manager of the railway department of the General Electric Co., Chicago, to come and witness the tests made on this mooted question of the amount of current consumed by these different equipments. We adopted double truck cars as a standard for our entire system five years ago. We have been using them ever since, and are continually increasing the number. We operate 350 miles of road, and have one electric line 61 miles in length. We try to build the equipment so that it will be interchangeable, in city use or in suburban service, as we have a consolidated system, and we run the cars interchangeably. I must take issue with Mr. Heft's statement, to the effect that four motors do not take more current than two motors. If you equip a car with two G. E. 1,000 motors, or four G. E. 1,000 motors, I think the four motors will take 20 per cent. more current than in the two motors; but the service with the four motors will be 50 per cent. better. That has been our experience. Our cars for three years were equipped with two motors. For the past two years, after careful experimenting and taking into account the various costs entering into the matter, of which the smallest is power, we have adopted four motors as a standard, be they of whatever size they may. We can get much better results from 150-h.p. in four motors under a car, than we can with 250-h.p. in two motors under the car. The results may differ in various sections of the country, but with us, the four motors have certainly taken from 20 to 25 per cent. more current than the two motors, running exactly similar conditions; not for the purpose of test, but in regular service on long distance or city lines, with watt-meter, volt-meter and ammeter on the car, so as to cover all the points. The use of these four motors is a very important thing on our standard car, which is 41 ft. over all, and seats 44 passengers with cross seats, and weighs somewhat more than the car referred to by Mr. Heft. In order to compete with the steam railroads we are now giving our attention to the development of a new car that shall be 50 ft. over all, upon which we propose to mount four 75-h.p. motors. The steam railroads throughout our Western country are beginning to realize that they have a real competitor in electric lines for distances of 50 or 60 miles, and as a consequence, they are reducing the rates of fare very materially and putting on additional high-speed trains to run short distances. We propose to build an electric car for the double purpose of being able to make 60 miles an hour with four of these motors and with the further purpose that in case we have a congestion of travel on any of the lines running to our summer resorts, we can hitch three or four trailers to the car and make 35 to 40 miles an hour, and to handle a larger body of people at a much reduced cost. With these cars which we are going to build, and under which we are to put four motors, we should want a more substantial construction than the cars shown in the drawings which have been submitted to us, although these cars may be all right for the service for which Mr. Heft designed them.

Mr. Foster: Our experience has been in operating four motors on the same type of car, over the same road, under the same conditions, as near as it is possible to obtain them, that it requires from 15 to 23 per cent. more current to operate four motors than two motors. We made tests twice a year, and pay for current on that basis, and we believe that the tests are carefully made, as they are made by the representatives of the Boston Elevated Railway Co., over whose tracks we operate, and which furnishes power to our company, and the tests are also made by experts representing our company.

Mr. Wason: On one of our suburban lines, we started two years ago to put on two 75-h.p. motors on each car, and found it almost impossible to make our time in the city, or in the country where there was any grade. We did that for the purpose of eliminating one-half of the repairs, as we supposed. Later, we removed the two 75-h.p. motors and put on four 50-h.p. motors, with much more satisfactory result, as we were able to make our time, and consumed but a very small amount of power more than the two 75-h.p. motors. The results were very much more satisfactory, and I think there is no question but for all suburban work, four motors are preferable to two motors, no matter what the amount of power you put into the motors is.

Mr. Harrington: I would ask Mr. Beggs what the tests showed where they ran two No. 57 motors, compared with four G. E. 1,000 motors; whether the results from the four G. E. 1,000 motors showed a lesser consumption in power than they had in the use of the two No. 57 motors.

Mr. Beggs: The current was less on the four G. E. 1,000 than on the two No. 57.

Mr. Harrington: Did you get better results?

Mr. Beggs: We got quicker acceleration. Whether your service is for eight miles an hour, about the standard for city service—our city service is maintained pretty close to nine miles an hour on the average—whether your service is for eight miles, or fifteen miles, or for fifty miles an hour, put four motors on a double truck car. The distance does not make any difference whatever. The main question with many roads in this matter is the increased investment, but you will save the interest on the increased investment in reduced cost of maintenance. It costs considerably less to maintain four motors under a car than it does to maintain two motors under the same car. The difference in cost of maintenance will more than offset the interest on the increased cost of investment.

Mr. H. H. Vreeland: Our peculiar conditions in New York are such that we cannot go into the character of construction which warrants the use of the standard double-truck car with four motors. We do it on a number of lines controlled by the syndicate which owns the New York lines, and wherever it is possible, and we are not held down to the matter of a sixteenth of an inch in step heights, as we are in Greater New York, we go to the square body car, and use the four motors. In New York longitudinal lines, by reason of Central Park, have to use very narrow streets. We have to conform to the old type of construction, with sunk panels, to keep the cars moving. We have a number of cross streets through which the important lines operate, and the difference between the sunk panel car and the square body car, means keeping the line in operation all the time, as against stoppages every once in awhile of from 10 to 20 minutes, owing to the numerous teams using the streets during the day. Take on our Fifty-ninth street line, running across town, if an ordinary truck is standing at the curb, the hub will go under the sunk panel of our car; and if we used a square body car, we should not be able to pass. We also find it necessary to have step raisers. The motorman can signal the conductor to raise the step and pass a truck without a stoppage of the car, which, under the ordinary conditions of a solid step, means a stoppage of the car, and when you are running the cars five seconds apart as we do in Center street, down-town, it is a great advantage to be able to raise the step and allow the car to pass.

The question under consideration is so local with us in that respect, that to discuss it from the standpoint these gentlemen have discussed it would not amount to much, except as concerns our experience with the consolidated system in New Jersey, where we run high speed, long distance, interurban cars. On that system, we use the large car with four motors. We get the largest carrying capacity car we can with the highest speeds, and d onot consider particularly whether there is more or less power consumed, if we can compete successfully with the surrounding steam railroad conditions. We have long lines and in every instance they are in competition with the steam railroads.

Mr. Sergeant: In regard to our elevated equipment, possibly we have been making a mistake. We are intending to use motor cars having one motor truck with two 150-h.p. motors on that truck. One motor truck and one trailer truck, every car a motor, using the multiple control system. I hope that inside of the next year, if you come to Boston, we can show it to you in successful operation. It will be the only elevated road which will go underground as well as elevated, and we have to overcome long grades of 5 per cent., and have descending grades of 8 per cent., and therefore, we feel we want the greatest acceleration we can get.

The Working of Suburban Passenger Traffic.*

BY H. G. DRURY, TRAFFIC SUPERINTENDENT GREAT EASTERN RAILWAY.

The satisfactory working of the suburban traffic of large cities is becoming yearly a more difficult problem.

It is probable that the difficulties experienced in London are in various degrees being felt in the cities on the Continent, and that this question is one of general interest throughout the commercial countries of Europe. The problem of how to provide adequate train accommodation for the stream of traffic to the town in the morning, and for its return in the evening, is found to be difficult in most cities. My observations will, however, be confined to the railways serving a large suburban area in London.

From a census taken by the corporation of the City of London† in 1891 it was found that over 1,000,000 persons entered the City of London—which I may here say covers an area of about one square mile—in each 24 hours. Of this number 266,000 persons were brought in by the railways having stations within its boundary. It may be estimated that these numbers are now increased from 30 to 40 per cent. Of the railway-borne traffic probably about 70 per cent. is brought into London between the hours of 6 and 10 a. m., during which hours the trains are in numerous cases overcrowded on the up journey and almost empty on the return. The capacity of each train is extended to its utmost, and the number of trains run is at these times of pressure as many as the block sections and terminal accommodation will admit, and more than is consistent with due regard to punctuality under all the varying circumstances affecting the running of trains.

The greatest carrying capacity of a railway can only be utilized by running trains all of equal speed. The demand, however, of the public for fast trains cannot be disregarded, especially as affecting the more distant suburbs. Yet the introduction of fast trains among trains calling at intermediate stations reduces the number of trains which can be worked over a section of railway to a large extent. The number of trains of equal speed which can be passed over the railway from London (Liverpool street) to Enfield in one hour is 15, while on the other hand, if a non-stopping train is alternated with a stopping train, the number is reduced to five per hour.

The Great Eastern Railway Company, to which I have the honor to belong, operates 85 miles of railway within 12 miles of London, having 99 passenger stations employing a staff of upwards of 3,000 persons, and serving a population of about a million and a half.

The Liverpool street station, the principal terminus of the company, situate within 500 yards of the Bank of England, has 18 platform lines. There are three up and three down lines from and to Liverpool street for a distance of about one mile, where they diverge into four up and four down lines. The following are a few particulars relating to the station:

Length of platforms	From 485 feet to 900 feet.
Width of platforms	From 13 feet to 56 feet.
Approximate number of passengers using station daily, (Number actually counted on one day in October, 1899)	150,647.
Number of roads	20.
" of points	153.
" of signals	211.
" of levers	424.

The greatest number of trains run *into* Liverpool street station in one hour is 41, and during 24 hours upwards of 1,100 trains arrive at and depart from the terminus. On week-days about 75,000 passengers are daily brought into this station, about 52,000 of whom arrive between 6 and 10 a. m.

The Great Eastern Company also bring into their Fenchurch street terminus, which is similarly situated within the city boundary, upwards of 32,000 passengers daily on week-days. The passengers coming into this station are from a limited section only of the suburban area. I may here mention that the published Government returns show that the Great Eastern Company carry a larger number of passengers than any other railway in the kingdom. The total number of passengers carried during 1899 was about 107,600,000 exclusive of 34,500 season ticket holders, which, estimating each season ticket holder to travel twelve times a week, would bring the total up to 129,128,000.

The normal formation of a Great Eastern suburban train consists of 15 vehicles carrying about 650 passengers. Each compartment accommodates 8 passengers first-class or 10 passengers second and third class, but wider trains have recently been introduced with satisfactory results, seating 8 passengers first-class and 12 passengers second and third-class in each compartment, thus increasing the carrying capacity of the train about 20 per cent.

The speed of a train necessarily depends on the frequency of its stoppages at the intermediate stations. Hereafter is a table showing the over-all speeds of trains on some of the railways engaged in carrying large numbers of passengers to and from London and its suburbs. A careful record taken shows that the time a suburban train is at rest at a platform for the purpose of discharging and taking in passengers ranges from 20 to 30 seconds.

Table Showing the Average Speed of Local Suburban Trains on the Undermentioned Railways.

Company.	Distance.	Number of stops.	Average distance between stops.	Total time on journey.	Average speed per hour inclusive of stops.	Average speed per hour exclusive of stops, 1 minute allowed for each stop and station purposes.
	Miles.		Yards.	Min.		
Great Eastern	10¾	14	1,261	41	15.7	23.9
Midland	11	13	1,383	41	16.0	23.5
South Western	11	12	1,489	37	17.8	26.4
North London	11¼	12	1,523	39	17.3	25.0
North Western	10¼	10	1,640	36	17.0	23.6
L. B. & S. C.	11¼	10	1,805	39	17.3	23.3
Metropolitan	11½	10	1,840	34	20.2	28.7
S. E. & C.	10¾	9	1,892	40	16.1	20.8
Great Northern	11¼	9	1,980	38	17.7	23.2
L., T. & S.	11¼	7	2,475	33	20.4	26.0
Great Western	10¾	6	2,703	30	21.5	26.8

*Extracts from a paper published in the September issue of the Bulletin of the International Railway Congress.

†The reader will no doubt observe the distinction between the City of London and London. The City covered by this one day census of 1891 is that area between the longitude of Temple Bar on the west and of the Tower on the east; extending northward from the Thames about 4,000 ft. London, which includes the City, has an area of about 70 square miles and a population of 5,634,000 souls (Metropolitan and City Police Districts. Census of 1896).—Editor *Railroad Gazette.*

night, giving a continuous service week in and week out with an interruption of only about seven hours on Sunday mornings. The number of engines in steam daily, used for suburban work, is 120, while the number of carriages employed is between 1,300 and 1,400. The system of signaling adopted by the Great Eastern Company on its suburban lines is the "Lock and Block" of Mr. Sykes.

The Great Eastern Company have devoted considerable attention to the question of the conveyance of the working classes at cheap fares to and from the city and other centers of business, and during the year 1898 carried no less than six millions. In this connection an endeavor has been made to spread the up morning traffic over as long a period as possible by means of special fares. By trains arriving at Liverpool street up to 7 a. m. cheap workmen's fares are charged; from 7 to 8 a. m. half the ordinary return fares; and after 8 a. m. the full fares. This arrangement has hitherto had the desired effect, but a decision under the cheap trains act applying to the conveyance of workmen recently given will probably prejudicially disturb this arrangement, which is one not only desirable for the comfort of the passengers but for the convenience of working.

The difficulty of working suburban services with safety, expedition, and punctuality is yearly being augmented by the increase of traffic, and I venture to make the following suggestions for consideration in order to facilitate the working of it:

1. That the engines should be constructed to start quickly, and rapidly to attain a good speed.

2. That the trains should be short buffered, constructed to carry as large a number of passengers as possible; but that the length of such train should not ordinarily exceed about 450 ft. including the engine.

3. That the engines and trains should be fitted throughout with automatic continuous breaks.

4. That the stations should be so constructed that the platforms are not on such curves as to prevent the guard at either end seeing the entire length of the train.

5. That the lines through the stations should be level.

6. That the block section should be about half a mile in length.

In conclusion, I would emphasize the importance of a careful attention on the part of railway managers to the working of the daily traffic between the environs of large cities—such as London, Paris, Berlin, New York and Boston—and their business centers. The existing conditions of social and business life are such as to make the punctual working of this kind of traffic a matter of great moment to the daily morning and evening traveler, and second only to that of safety.

In the case of my own company, experience has shown that nothing so much tends to the residential development of a suburban district and so effectually secures the confidence of the daily passenger, as a liberal train service, and strict and continued adherence to scheduled times; nor, on the other hand, does any condition so tend to destroy this confidence, and generate discontent, as the unreliable arrival of the morning business trains.

In the former respect it is my privilege to be able to claim for my company some measure of success, and the rapidity with which their *suburban* district has acquired an *urban* character is one of the satisfactory results.

It would be interesting to learn, from some of the able gentlemen who have the care of the suburban train working to and from the large European and American cities, some particulars of their experience in moving their daily business traffic, and how far they have been able to achieve results satisfactory to themselves; also, whether they attribute their success to any special system, or principle of working, which they may have found it desirable in their wisdom to adopt.

Politics and Railroads in Canada.

Here in Canada the money question cuts no sort of figure. Our banking system is a good one; circulation adjusts itself automatically to the fluctuating requirements of trade and the noteholder is thoroughly secured. Hence, the farmers as a body are satisfied with things as they are. In the Dominion General Election Campaign now in progress, however, Manitoba farmers are advocating Government ownership of railroads. It is not suggested that the existing lines should be purchased—Canada could not afford that—but, that henceforth all new lines should be built and operated by government. The main ground on which this demand is based is that although the Dominion Government, the various Provincial Governments, and the municipalities have voted, all told, about $220,000,000 to railroads, without counting land grants, the public have no real control except in the case of the Intercolonial, which was built and is operated by the Dominion Government.

As a matter of fact, the Railway Committee of the Privy Council at Ottawa, exercises a tolerably efficient control over all the private railways. It hears complaints regarding rates, undue preferences, and has to do with running powers, expropriations, and crossings, traffic arrangements, and the like; no company may levy rates until they have been approved by it, any one with a grievance may submit it by letter, that is, is not obliged to appear at Ottawa in person or by counsel; and if he fails to make out his case, the costs are paid by the Government provided he has acted in good faith. There is no doubt, I think, that the Committee serves the public as well as the Interstate Commission at Washington, whose usefulness has been impaired by recent decisions of the courts.

All things considered, too, the Manitoba farmer is well supplied with railways, the mileage per thousand of the population being greater than in any of the newer states south of the boundary; whilst rates on the Canadian Pacific, local as well as through, are lower than rates in Dakota or Minnesota. He is asking for Government ownership principally because he thinks it would be the means of reducing rates at the expense of the taxpayer at large.

But the taxpayer in the older provinces is not disposed to rise to that height of altruism, his experience of Government ownership in the case of the Intercolonial having been singularly discouraging. To state the facts very briefly, the Intercolonial system, including the Prince Edward Island Railway, is 1,300 miles long. A roundabout route was chosen ostensibly to withdraw the line as far as possible from the American frontier, in reality to enable the Government of the day to obtain the support of Northern New Brunswick for Confederation. There was a good deal of corruption in connection with the contracts, and ever since the road was opened it has been run, more or less openly, as a party machine. Politics have corrupted the management, and the management in turn has corrupted politics.

No matter whether Liberals or Conservatives are in power, the cost of operating is far higher than on other lines. Stations were planted thick to satisfy persons who had land to sell and create other patronage; buildings of various kinds, like the huge elevator at Halifax, have been erected to carry bye-elections or furnish contracts to political allies; and branch lines constructed with an eye to the effect on the constituencies traversed. Rebates are given to friends, or, what comes to the same, the friend gets the benefit of underbilling—he is allowed to place, say, 35,000 lbs. of freight in a car and charged for only 24,000 lbs., whereas the political opponent is made to pay for the actual quantity shipped. When a new Cabinet or a new Minister of Railways comes in, an effort is made to banish abuses of this sort, but the party friends are generally strong enough to block reform.

The number of employees is excessive, but as they are voters and usually active party workers, it is not easy for the most resolute of Ministers to get rid of them, even when they are known to be dishonest. Much of the time of the members who support the Government is occupied with matters of railway patronage or in pressing claims for damages, etc., not in every instance genuine. Rates are lower as a rule than on other lines because the people along the route insist on low rates, knowing that the deficit will have to be shouldered not by themselves but by the general treasury. To reduce the deficit the Minister is tempted to charge to capital items which ought to be charged against revenue; the opposition for the time being protests, but does the same thing when its turn of office comes. The chief engineer has cited an instance where a farmer, whose claim was nursed by politicians, demanded $60,000 for $10 worth of sand taken from his land. The cost of building a branch, 14 miles long, from St. Charles to Levis, opposite Quebec, was estimated at $750,000, which included the land expropriations; the actual cost to date amounts to nearly $2,000,000. . . .

Moreover, mixed ownership is, as usual, beginning to work injustice, private lines having to compete with the Government railways that are not expected to earn dividends, or even to make both ends meet. It is not at all likely, then, that the Dominion Government will undertake to build and operate lines in the Northwest. The Government of the Province of Manitoba is committed to provincial ownership, but cannot very well build a trunk line to Lake Superior, whether to Fort William or to Duluth; whilst province-owned branches, serving as mere feeders of the Canadian Pacific or the Northern Pacific, could not, of course, reduce rates to Lake Superior or the Seaboard.—*The Economist, Winnipeg Correspondence.*

TECHNICAL.

Manufacturing and Business.

The Ohio River & Lake Erie is in the market for miscellaneous machinery and supplies.

The 2,500 box cars being built by the Pullman Co. for the Baltimore & Ohio will be equipped with Dunham car door fixtures.

Duff Manufacturing Co., of Allegheny, Pa., makers of the "Barrett Jack" have recently received orders from Russia for 128 of their Jacks, from England 75, and from Australia 80.

James T. Goodwin has resigned as foreman boiler maker of the Rogers Locomotive Co. to take charge of the new boiler shop of the Richmond Locomotive & Machine Works, now nearing completion.

Ten large size Wells lights are being used to facilitate the work at night of removing the debris caused by the explosion in the building of Tarrant & Co., Warren street, New York, Oct. 29. These lights are made by the Wells Light Mfg. Co. (Edward Robinson, Sole Proprietor), New York City.

At a meeting, held Oct. 26, certain changes in the officers of the H. W. Johns Mfg. Co. took place. Mr. Martin retired as President to attend to his interests in asbestos mines. Mr. H. W. Johns was elected President and Mr. George W. Gladwin was elected Vice-President and General Manager. Mr. Gladwin has been 16 years with the company, practically all of his business life, and for some years has been Manager of the Paint Department.

Iron and Steel.

The Lake Shore & Michigan Southern has let a contract to the Carnegie Steel Co. for 25,000 tons of rails.

Cable dispatches report that British railmakers have reduced the price of rails in Great Britain from £7 5s a ton to £6 10s.

P. A. B. Widener has been elected a director of the American Steel & Wire Co., to fill the vacancy caused by the resignation of C. T. Boynton of Chicago.

The National Steel Co. has a contract for 3,000 tons of 70-lb. rails, to be delivered within six months to the Clover Leaf. Another contract for 5,000 tons, it is said, will follow shortly.

It is announced that the Troy Steel Co. will be reorganized. The mortgage of $1,750,000 held by the Guaranty Trust Co., will be foreclosed. Frank S. Witherbee, of Port Henry, N. Y., has been appointed Receiver.

John S. Ouster, Superintendent of the National Steel Works at St. Mingo Junction, Ohio, has been appointed Superintendent of the Works at Youngstown, succeeding Guy R. Johnson, who will superintend the Carnegie furnaces at Duquesne.

The Pennsylvania R. R. has ordered 144,000 tons of rails, placed as follows: Carnegie Steel Co., 38,000 tons; Cambria Steel Co., 28,000 tons; Federal Steel Co., 24,000 tons; Pennsylvania Steel Co., 24,000; National Steel Co., 18,000 tons; Lackawanna Iron & Steel Co., 12,000 tons.

Bids are wanted by the Board of Trustees of the Commissioners of Water Works of the city of Cincinnati, Ohio, until Tuesday, Nov. 13, for making, furnishing and delivering cast-iron pipe and special castings for the settling reservoirs and for the pump mains from the eastern pumping station, near California, Ohio. A bond for $10,000 must accompany each bid. August Hermann, President.

Dun's Review says: Conditions in the iron and steel market steadily improve; orders gradually swell in volume, and buyers make less effort to secure concessions. In most cases quotations are not altered, but there is an advance to $20 at Philadelphia for billets, owing to the better business in rails. Pig iron moves freely, especially at Chicago, where makers have contracted heavily for finished stuff in excess of raw material on hand. Cast-iron pipe is in urgent demand, and new plans for ship building will take plates. Bridge builders are buying structural forms heavily.

Water Power from the Chicago Drainage Channel.

Viewed as a prime mover in cheap generating of electric power the Drainage Channel is practically a great mill race that may be tapped to any extent that will not cause a destructive current in the main channel. The "mill pond," the chain of lakes, offers a reliable water supply. It is attractive to think of this channel extended to the Mississippi River and its banks lined with turbine-driven electric power plants and factories. This general project is being seriously considered. The Economy Light & Power Company's Joliet plant of 40 turbines, having 10,000 estimated horse-power, is nearly completed and is an example of what may follow at other available locations. This plant, as now planned, will have 38 66-in. turbines of 250-h.p. each under a head of 14 ft., and two 48-in. turbines of 125-h.p. each at 10 ft. head. The figures given are for power estimated with the usual reserve and there will doubtless be available a total somewhat greater than 10,000-h.p. The turbines will be made by the S. Morgan Smith Company. The two 48-in. turbines will be direct-connected to two 75-k.w. 125-volt, direct-current exciters. Thirty-six of the 66-in. turbines will be connected in groups of six wheels each. The turbines of each group will be connected by gears to a main shaft which carries a 750-k.w. generator. The turbines will be individually connected to the shaft, so that the generator can be driven by any number of wheels necessary to be used with a varying head of water. It is expected that in high water three wheels only, of each group, will be used and that when the water is low the six turbines will be called into use. The remaining two 66-in. turbines will be placed at the south end of the power plant and will drive a 375-k.w. generator. The final equipment of the plant as now intended will include one 375-k.w. and six 750-k.w. generators. The installation of the generators was begun by placing two of the 750-k.w. generators and one 375-k.w. machine. They are of General Electric make, revolving type, three-phase, 60-cycle, alternating current, 2,300 volts. The powerhouse will have an average width of 28 ft. and a total length of 850 ft. At about the half length of the building the structure will be widened to 40 ft. for about 60 ft.

The Goodwin Car at Paris.

Mr. Plowman, Chief of Construction of the Goodwin Car Company, writes to us: "I spent four months assisting our representative at the Exposition. The exhibit of our car there has more than met our expectations and has been in every way a success. We have on exhibition there a working model of our steel car and dumping barge. We received a silver medal at the National Export Exposition at Philadelphia in 1899 and we have also received a similar medal at the Paris Exposition.

"We were visited by railroad men, engineers and contractors from all parts of the world who were very much interested in the Goodwin car. The fact that our car with its dumping action by compressed air differs so radically from anything known in European practice, has made it an object of great interest to European engineers. The design of our car which allows of its being converted into an armorclad car at a moment's notice without change of construction was also a feature of great interest to Government engineers in Europe. Our exhibit is in charge of Mr. Eugene Richter, assisted by Mr. Paul Richter."

Fay & Egan at Paris.

As noted recently, the J. A. Fay & Egan Co., Cincinnati, Ohio, was awarded the grand prix at the Paris Exhibition and its exhibition of wood-working machinery was among the largest of the foreign exhibits of the kind. To the same company was also given highest awards at the Paris Exhibitions of 1878 and 1889. Among the more important machines shown at Paris this year were band saws of various designs, sand paper machines, planers, spoke lathes, automatic gage lathes, vertical carboring machines, matchers and jointers, tenoners and circular saws, covered by patents not more than two years old.

Pullman Cars in Bavaria.

The Bavarian State Railroads have had two passenger cars built by the Pullman Company, which arrived last

September and seem to attract much attention. Briefly speaking, they are American cars (end entrances, long, on four-wheeled trucks, vestibuled platforms, raised roof), modified for European use. There is a side passage, and compartments open off from this, three first-class and three second-class in each car, with a washroom and closet at each end. Eight-wheeled passenger cars with end entrances have been common in Germany of late years, but they have all been built there. The Bavarians have ordered these to study the peculiarities of American construction at their leisure.

Rolling Stock for Finland.

The *Commercial and Industrial Gazette*, of St. Petersburg, announces that the railroad administration of Finland is making the following additions to its rolling stock: Twelve passenger locomotives at a total cost of 1,020,000 marks (1 Finnish mark = about 20 cents); 20 freight locomotives at a total cost of 1,500,000 marks; 250 closed freight cars, at 880,000 marks; 250 open freight trucks, at 770,000 marks; 16 steam engines, at 963,000 marks; 50 passenger cars, at 604,000 marks; 20 guard's vans, at 200,000 marks; 15 baggage vans, at 120,000 marks; 2 gas generating machines, at 21,000 marks. For the Helsingfors-Karis branch the railroad administration is buying 6 freight locomotives, 1 third-class passenger car, 2 guard's vans, 15 closed and 100 open freight cars and 1 snow plow, the total estimate for the purpose being 854,000 marks. At the end of 1899 the Finnish State Railways had a total length of 1,645 miles, the rolling stock consisting at that time of 268 engines, 723 passenger, and 7,562 freight cars. Mr. G. Stromberg, of Helsingfors, Finland, is Chairman and General Manager of the Finnish State Railroads, whilst Mr. Aug. Granfelt, Helsingfors, is Engineer-in-Chief of Way and Works, and Mr. K. A. Nordman, of Helsingfors, Chief Engineer of Rolling Stock. The gage is 1.523 meter, or 5 ft., the same gage as that of the Russian State Railways.

Dynamometer Tests.

The new dynamometer car owned jointly by the University of Illinois and the Illinois Central R. R. is now being used in traction tests between Centralia and Mounds, Ill. The performance of the new heavy freight locomotives will be compared with that of the smaller locomotives which have been standard on the road.

THE SCRAP HEAP.

Notes.

The State of Indiana has brought suit against the Cleveland, Cincinnati, Chicago and St. Louis for $35,000 penalty for failure to maintain a bulletin of delayed trains at a small station.

A suit has been begun at Louisville, Ky., against the Pennsylvania Company for $10,000 damages in behalf of a man who claims to have been blacklisted by the company at the time of the strikes of 1894.

The Middle Division of the Pennsylvania Railroad has again broken its own record in the magnitude of the freight movement for a day and also in the record for a month. On October 26 the movement of cars between Altoona and Harrisburg was 6,800.

On Tuesday of last week President Williams and other officers of the Seaboard Air Line took a large party of the security holders of the road and other investors on an inspection trip to Savannah, Jacksonville and other prominent points on the company's lines.

On Friday of last week two men were arrested at Chicago who had in their possession stamps for printing the autographs of the general passenger agents of the New York Central, the Erie, the Norfolk and Western and other transportation lines, and other evidence that they were dealers in fraudulent tickets. The prisoners gave their names as Rosenberg and Ashelby. They were apprehended by a rubber stamp maker to whom they went to get made a copy of the signature of James C. Cassell, General Superintendent of the Norfolk and Western.

The electric railroads are constantly introducing greater variety into their accident records, being determined, apparently, to match the steam railroads in every feature of operation which will make things interesting for the passengers. The latest novelty reported in the newspapers is a rear collision due to a break-in-two. This was on a line between Chicago and Evanston. A pin holding the coupling between a motor car and a trailer was in some unknown manner dislodged, and the trailer fell back some 300 ft. before anyone noticed the separation; then a passenger pulled the bell cord and the foremost car was promptly brought to a stop. The trailer kept on and five persons were injured; and there was a small panic among the uninjured.

Traffic Notes.

The railroads carrying grain between Buffalo and New York announce an increase Nov. 1 in the rate on grain from lake vessels, from three cents per 100 lbs. to four cents.

Press despatches say that there is a great glut of grain in the railroads of Washington and Oregon. It is said that at Tacoma over 3,500,000 bushels of wheat is waiting to be shipped eastward in cars.

The Court of Appeals of New York has affirmed the decision of the Lower Court in favor of Corcoran against the New York Central in a case concerning the refusal of a conductor to accept mileage-book coupons. The regulations required that the coupons should be exchanged at the ticket office for a ticket, and the plaintiff claimed exemption from this rule on the ground among other things that the ticket agent was busy outside the office. The plaintiff was put off the train for refusing to pay fare and sued for damages. It appears that the question whether the statute requiring conductors to accept coupons is constitutional was not discussed by the courts.

A Lubricated Projectile.

A new 6-in. projectile for naval guns has been made which, in appearance, can be distinguished from the ordinary projectile only by a cap on its nose. This cap is of soft steel, backed with graphite, which enables the point of the shell proper to strike a cushion made by the soft steel, and then by the assistance of the graphite as a lubricant, the shell, revolving at an exceedingly high rate, bores its way through the armor plate.—*Graphite.*

The Train-Caller's Art.

The only man in St. Louis whose calling is a profession and whose profession is his calling is Ben Brown. In his official capacity he has a speaking acquaintance with every one who has occasion to travel to, from or through St. Louis. He is train-caller for the Terminal Association, and his voice is his fortune. Every day he announces to waiting passengers the departure of 150 trains from three points in Union Station, making 450 announcements. No other man in the city can do as much talking in so loud a tone and keep it up day in and day out, and, strange to say, his tones are as soft and mellow as those of Edouard De Reske. "I've been in training for this work since I was quite a young man," said Brown. "You see, I started out in life as a minstrel. After that I did vocal stunts with a circus; then drifted back into minstrelsy, and from that into the railroad business. Calling trains is very much like singing in public—only it's very different. In the first place, one has to learn to face any kind of a crowd, under any circumstances and not get rattled. In the second place, one must thoroughly understand the principles of enunciation—every word must be intelligible as far as it can be heard. To accomplish this it is necessary to pronounce each syllable distinctly and at the same time connectedly. If a caller talks too fast he is not understood, and talking too slow is even worse. Screaming does more harm than good, and the man doesn't last long, either. I always call in my natural voice, as loud as may be necessary, but always in a natural chest tone. In singing it would be the baritone register. When I announce a train the passengers get right up, pick up their belongings and start for the proper track. Not once in fifty times does any one come and ask me to repeat the directions. I tell them all that is necessary, including the main stations along the road and the number of the track on which the train is standing. They hear every syllable and take it all in. Then they get up and go. The best remedy for hoarseness, or colds of any kind is salt. When I wake up hoarse I eat a handful of salt. That makes me thirsty and I drink lots of water. The water works out through the pores and the cold is gone. I have never been hoarse for more than three hours.—*St. Louis Globe-Democrat.*

Railroad Employees' Pensions in Russia.

Mr. Reitlinger, one of the Russian railroad officers now in America to attend the conference of the Railroad Young Men's Christian Association, has told a Philadelphia reporter about pensions in Russia, as follows: "We do many things in the interest of our employees, free medical service, burial, fire or flood insurance, houses and schools and other things. The men themselves have organized savings banks, co-operative stores, clubs and libraries. There are 36 co-operative stores with 40,000 members, buying annually merchandise to the value of $2,000,000. About 350,000 of our employees receive pay monthly, and are obliged to become members of the pension and aid funds. The irregular employees, to the number of 150,000, are not obliged, but may do so. All pay 6 per cent. of their salaries toward the funds, and 3 per cent. is paid by the Government or private parties owning the road. Members leaving the service receive annuities according to what they have paid in and length of service, which must be at least 15 years. We have rural colonies, where live those disabled by old age, sickness or other causes. These are small villages for the exclusive use of the pensioners, and where all needful living requirements are furnished."

Railroad Flower Gardens—What to Plant.

In the Brooklyn (N. Y.) *Eagle* of recent date Mr. Paul Huebner, of Philadelphia, who appears to be the landscape gardener of the Philadelphia & Reading Railroad, gives some of his ideas about how to conduct the gardening department of a railroad. He believes that a road should raise its own plants and trees, as, after the first year, there is little expense except wages. Continuing Mr. Huebner says:

"I plant every season about 100,000 flowering and foliage plants, about as follows: 16,000 geraniums, 5,000 cannas, 18,000 alternantheras, 2,000 scarlet sages, 2,000 Begonia Vernon and varieties, 2,000 ageratums, 15,000 echeverias, 40,000 coleus, 3,000 abutilons, 2,000 acalphas, 1,000 centaurea candidissimas and 4,000 miscellaneous plants, such as celosias, Amaranthuse, petunias, zinnias, vincas, etc. These would cost at least $5,000 to buy, and the whole cost of producing the same is less than half that sum.

"I believe in planting privet hedges as a live snowfence. These hedges are neat, effective and permanent, and they are inexpensive. The privet I consider one of the finest hedge plants for this latitude. It is almost evergreen, has no insect or fungoid enemies, is a quick grower, and does not winter kill.

"For shrubbery, I use a dozen or more different varieties, such as deutzias, forsythias, spiraeas, althaeas, weigelas, dogwoods, etc. One of the very best is hydrangea paniculata grandiflora. I use this quite largely, and find it very ornamental and lasting. Its flowers are so showy and persistent that its season continues much longer than others. * * * Among geraniums I recommend La Pilote for scarlet; for pink I use Mme. Thiabaud, the best bloomer under all circumstances. For a light pink I use Glorieuse, a dwarf grower and very fine bloomer. For salmon, Mrs. E. G. Hill, also a constant bloomer. For white, Mme. Bazain. For edging I use the Mme. Salleroi.

"Among cannas, Mme. Crozy has not been beaten yet in its color. For scarlet Beaute de Poitevine is one of the finest.

"One of the most valuable bedding plants is Begonia Vernon, and I must say a good word for Erfordi. These varieties can stand a bright sun, and are very showy."

Conditions for the Proposed Railroad in British Honduras.

The bids for building the proposed line in British Honduras were withdrawn some time ago because of advances in railroad material, but the Government has recently made public the contract which the American Consul at Belize forwards. A company is to be formed, with a capital stock of £700,000 ($3,406,550), of which at least £675,000 must be bona fide subscriptions, payable in such installments as are approved by the Crown agents. The contractors shall use their best efforts to procure a concession from the Government of Guatemala for an extension of the road in that country. If the authorization is not obtained in nine months either of the parties to the contract may terminate it. The company is to build and equip a railroad of 2 ft. gage from Belize through the colony to the Guatemala frontier. Surveys must be begun within three months from the date of the contract. The building calls for about 75 miles of road, divided into sections of about 15 miles each. The first section is to be completed within 21 months from the date of the contract; the second, 27 months; the third, 33 months; the fourth, 36 months, and the fifth, 39 months. Surveys on each section must be made at least 18 months before the date of its completion. The Government shall pay a subsidy of £75,000 ($364,989) in gold in five installments of £15,000, one for each section as finished; also a subsidy of 2,000 acres of Crown lands. The company must also build a landing pier at Belize, with the depth of water at the sea end not less than 19 ft. at low water.

The Circus in Tennessee.

Among the scores of half-column articles from the daily newspapers, describing startling railroad accidents, which we have had to condense into four-line paragraphs for our record during the past month, there is one which we have had to throw out. No loss was incurred and we cannot recognize the occurrence as an "accident." But the reader should have the facts, and we give them here. The account describes a break-in-two of a circus train near Chattanooga, which caused no damage (except the ordinary wear and tear of the reporter's brain), but which furnished a first-class "reading notice" for the breakfast tables of the town where the circus was to show on the following day. The train, consisting of 21 enormous cars, started all right. Everything went along smoothly. After a time a very heavy grade was encountered. Then the grade became undulating; and just then the elephant, in the sixteenth car, happened to think that his keeper had forgotten to bring around the luncheon of apples and chocolate creams, which was usually produced about this time of night. After waiting impatiently for some time, the beast stuck his trunk out of the front window and sniffed around to see what he could find; and, in the annoying absence of eatables he grasped the unlocking chain of the "Jame" (sic) coupler; and in the twinkling of an eye the train was cut in two. The rest of the story need not be told; the reader is familiar with the ways in which enginemen discover such little accidents and, by the turn of a finger, save millions of dollars' worth of property and scores and scores of lives. In this case the second section of the circus train, following close behind, had eight sleeping cars full of performers, each one drawing a $5,000 salary. This second ponderous train thundered along at furious speed, was flagged, and finally was stopped with the pilot of the locomotive only 2¾ in. from the rear end of the first train. The proprietor of the circus distributed $200 gold watches to the trainmen, as a slight testimonial to their vigilance.

Common Bicycles on Railroad Track.

A. M. Rothschild & Co., of Chicago, advertise "The Perfect Attachment" by which any ordinary bicycle can be used on railroad track. It consists of a three-armed outrigger, with a very small wheel to run on the right hand rail, the bicycle being run on the left hand. The attachment costs $10, weighs eight pounds, and, according to the circular, can be put on or taken off any bicycle in three minutes. Testimonials are printed from section foremen, linemen and from various users who apparently have no connection with railroads except as trespassers.

A New Railroad for Syria.

Consul-General Dickinson, of Constantinople, writes as follows: "The delay in obtaining the British concession for the proposed railroad line from the Syrian coast at Haifa to the city of Damascus seems now to be at an end. The line is to be single track and is to be about 120 miles long. The most profitable business in sight will be carrying wheat from the Hauran district to the coast. The road will also be a competitor for the through traffic which now goes over the narrow-gage road from Damascus to Beirut, and it will have a distinct advantage over the latter on account of its easier grades. Contracts for the supply of material have not yet been let, and proposals from American manufacturers are desired. Communications should be addressed to A. J. Hill, Thames Iron Works, London.

Brakes and Couplers on the Santa Fe.

There are 28,042 freight cars belonging to the Santa Fe System, 28,024 of which are equipped with air-brakes and 27,710 with automatic couplers.

Portland Cement in Kansas.

The largest Portland cement plant in the United States, and the first established west of the Missouri River, has just been completed at Iola, Kan., on the Atchison, Topeka & Santa Fe Railway. Its capacity will be 5,000 barrels per day. It is now running at half capacity, and the quality of the product so far manufactured has proved equal to the imported cement. The material used, which is in large quantities, was discovered by the Industrial Commissioner of the Santa Fe, who submitted the opportunity to experienced Portland cement operators, who formed the Iola company.

The Metric System in Russia.

Under date of Sept. 29, 1900, Vice-Consul-General Hanauer, of Frankfort, writes that according to the St. Petersburg *Gazette*, the Russian Government has decided to adopt the metric standard of weights and measures, and the Ministry of Finance is now engaged in considering the time and manner of introducing this reform.

Manchester Ship Canal.

The Manchester Ship Canal, in the first half of this year, yielded £16 488 towards paying the £112,500 of interest which the City of Manchester has to pay on the capital it invested in the enterprise. The freight-paying tolls on the canal amounted to 1,487,841 tons in the half year, which was 12 per cent. more than the year before.

Contingent Orders.

In an address before the Honest Democratic League of Maryland, President John K. Cowen, of the Baltimore & Ohio Railroad, made the statement that in the event of the election of Mr. Bryan the Baltimore & Ohio would withhold contracts for cars amounting to hundreds of thousands of dollars. We know that other orders for material are contingent on the election and that construction of new road is also held up in several cases.

Cement in South Africa.

Mr. J. G. Stowe, Consul General at Cape Town, writes: "No country is a better customer for cement than South Africa. All public buildings, warehouses, stores, and residences are built of brick, cemented on the outside. No wood, or 'frame,' houses are seen. The bricks used in South Africa are two-sevenths larger than the Ameri-

can bricks and are 'laid up' principally with 'mud,' the inferior clay found here, instead of mortar (lime) or cement. Over the whole surface, cement is laid. Bricks of different shapes form the window sills, caps, columns, pilasters, moldings, etc., and over these is spread the cement. Cement is also used in making drainpipes, sidewalks, stoops, tiles, chimney pots or tops. Brick exteriors are never seen, as the bricks are inferior, the best qualities being made of clay and coal cinders. Of the cement imports for 1899, amounting to 126,672,875 pounds, Belgium furnished 18,423,628 pounds; Germany, 7,448,395 pounds; other countries, 605 pounds; and the United Kingdom the balance. During 1900, the imports of cement from Germany have been increasing rapidly, as it has been found that German cement is equally as good as the best English Portland and can be bought at 1s (24 cents) per barrel cheaper. Belgian cement is good and sells at 18d (36 cents) cheaper than the English. While the United States, at the present time, would be hampered on account of the excessive steamship rates to this country, which would prevent competition with the German and Belgian cements, yet I am convinced, with equal rates, the United States cement could find a market here in large quantities. Cement of the desired quality will never be manufactured here, as the ingredients do not exist."

French Coal and Iron Production.

The Minister of Public Works has published statistics of the production of the coal, iron and steel industries of France for the first six months of 1900. The production of anthracite and bituminous coal was 16,196,966 tons of 1,000 kilograms (2,204.6 lbs.) The annual consumption of coal in France is about 42,000,000 tons, and the production 32,000,000 tons, leaving 10,000,000 tons to be imported to supply the deficiency. Of this latter, about 7,000,000 tons are brought from Great Britain and 3,000,000 tons from Belgium and Germany.

Production of Iron, Rails, Etc., for First Six Months of 1900.

	Tons.
Pig iron	1,341,988
Commercial iron	373,078
Rails	
Bessemer	143,946
Open hearth	2,857
Commercial steel:	
Bessemer	161,436
Open hearth	173,139
Crucible steel	9,112
Sheet steel:	
Bessemer	36,252
Open hearth	124,960

River and Harbor Works.

In the annual report of General Wilson, Chief of Engineers, U. S. A., the following estimates for river and harbor work in the vicinity of New York are made for next year:

Channel in Gowanus Bay, Bay Ridge, Red Hook and Buttermilk Channels, $284,000; New York Harbor, $400,000; East River, $200,000; Harlem River, $300,000.

The total estimates for river and harbor improvements throughout the country aggregate $20,000,000, to which are added $200,000 for surveys and contingencies, $3,800,000 for the Mississippi River Commission, $1,040,000 under the Missouri River Commission, $15,000 under the California Debris Commission, and $72,800 to prevent deposits in New York Harbor. The expenditures for the year ending 1900 were $18,485,298, which does not include $125,000 paid to the Eads estate for maintaining the jetties at the mouth of the Mississippi, and $61,000 for surveys and examinations for a canal from the Great Lakes to the Atlantic.

LOCOMOTIVE BUILDING.

The Union Pacific, it is reported, will increase its order for engines.

The Boston & Maine is considering placing an order for more locomotives, including 10 of the consolidation type.

The Seaboard Air Line has ordered 10 switching engines from the Pittsburgh Locomotive & Car Works, and is in the market for more locomotives.

The Baldwin Locomotive Works are working on the following orders: *Arcata & Mad River*, one engine; *California State Board of Harbor Commissioners*, one switching engine; *The Babcock & Wilcox Co.*, New York, one switching engine; *Atlantic Coast Line*, two engines, and *Shreveport & Red River Valley*, one engine.

The Delaware, Lackawanna & Western has ordered a large number of locomotives from the Schenectady Locomotive Works, and some from the Dickson Locomotive Works. The number has not been given out officially but we believe between 50 and 60 in all were ordered. We have already stated that the Dickson Locomotive Works had an order for 10 from this road.

CAR BUILDING.

The Ohio River & Lake Erie is in the market for some cars.

The Lehigh Valley is in the market for five or six passenger cars.

The Chicago & Northwestern is in the market for 40 cars for passenger service.

The Pere Marquette has ordered 500 box cars from the American Car & Foundry Co.

The New York, New Haven & Hartford has ordered 100 coal cars from the Keith Mfg. Co.

The Central of New Jersey is in the market for 26 passenger cars and for some freight cars.

The Missouri, Kansas & Texas, it is reported, will soon be in the market for more freight cars.

The Erie is in the market for 30 passenger coaches. It is expected the order will be placed next month.

The Somerset has ordered 100 box and 10 flat cars, all of 60,000 lbs. capacity, from the American Car & Foundry Co.

The Missouri Pacific has ordered 1,000 coal cars, of 60,000 lbs. capacity, from the American Car & Foundry Co.

The People's Gas Light & Coke Co., Chicago, has ordered six additional tank cars from the Illinois Car & Equipment Co.

The Plant System has ordered 150 box cars from the Georgia Car & Mfg. Co. and 50 flat cars from the Southern Car & Foundry Co.

The Colorado Springs & Cripple Creek District has ordered 50 coal, 25 flat and 125 stock cars from the American Car & Foundry Co., all to be 60,000 lbs. capacity.

The Kansas City, Fort Scott & Memphis has ordered 400 coal cars from the American Car & Foundry Co. and 100 from the Southern Car & Foundry Co., all to be of 60,000 lbs. capacity.

The Lake Shore & Michigan Southern has ordered 500 steel gondola cars from the Pressed Steel Car Co. and 500 wooden cars of the same type from the American Car & Foundry Co. The road is also getting prices on 200 furniture cars.

The Seaboard Air Line is in the market for 20 passenger and five express cars. The specifications call for Westinghouse brakes, National hollow brake-beams, Standard couplers, Chicago automatic frictionless side-bearings, Standard steel platforms, Pintsch gas, Powers regulators, Ajax journal bearings and the Baker and Safety Car Heating & Lighting Company's system of steam heat. The passenger cars will have French springs and the express cars Scott springs. The road is also in the market for 3,000 freight cars.

The Atlanta & West Point order with the Mount Vernon Car Mfg. Co., referred to last week, includes, as stated, 100 box cars. They will be of 60,000 lbs. capacity, weigh 35,000 lbs. and measure 36 ft. long, 8 ft. 3 in. wide and 7 ft. 5 in. high. The specifications call for Shickle, Harrison & Howard steel bolsters, National hollow brake-beams, Westinghouse brakes, Ajax brasses, Standard couplers, Wagner flush doors, M. C. B. standard cast-iron journal boxes with Fletcher lids, Murphy Improved roofs, French springs and Shickle, Harrison & Howard steel trucks.

BRIDGE BUILDING.

Alexandria, La.—We are informed that the Shreveport & Red River Valley Ry. is considering the advisability of building a bridge over the Red River at Alexandria. Plans were made some time ago for such a bridge by J. A. L. Waddell, of Kansas City, Mo.

Alliance, Ohio.—The Ohio River & Lake Erie R. R., we are informed, expects to replace several bridges on its line in the near future.

Atlanta, Ga.—The City Engineer will receive bids, on Nov. 26, for the Whitehall street viaduct. It will be a steel structure 500 ft. long, including approaches, and 36 ft. wide. R. M. Clayton, City Engineer.

Boston, Mass.—In a loan bill submitted to the Board of Aldermen last week, there is a $500,000 item for the proposed Congress street bridge.

Bowlusville, Ohio.—A. K. Hahn, County Auditor, informs us that there is no truth in the report that Clark and Champaign counties contemplate building a bridge at this place, as recently reported.

Cannington, Ont.—A bridge will be built over the Trent Canal at the Center road.

Chicago, Ill.—Several ordinances are pending action by the City Council, which cover the following extensions of the track elevation system:

Chicago & Northwestern—In Kinzie street, west from Ada street to the present commencement of track elevation; also the Mayfair cat-off line in Forty-sixth avenue, from Kinzie street to Milwaukee avenue.

Chicago, Milwaukee & St. Paul—From North Fortieth avenue to North Fifty-sixth avenue.

Chicago, Rock Island & Pacific—North from Twelfth street into the Van Buren street terminal station.

Chicago & Western Indiana—In Forty-sixth avenue, from Kinzie street to Bloomingdale Road; also this road and the Wabash Railroad, north of Fifty-sixth street.

Illinois Central—South of Sixty-seventh street.

Lake Shore & Michigan Southern—North of Twelfth street into the Van Buren street terminal station.

Pittsburg, Cincinnati, St. Louis & Chicago—In Kinzie street, in connection with the parallel tracks of the Chicago & Northwestern and the Chicago, Milwaukee & St. Paul.

Cincinnati, Ohio.—The contract for the substructure for the new bridge over Mill Creek at Spring Grove avenue is reported let and bids are now wanted on the superstructure.

Cleveland, Ohio.—We are informed that bids are wanted, Nov. 9, by the Department of Public Works, James Ritchie, Chief Engineer, for the foundations of the bridge proposed over the Cuyahoga River at Seneca street. Plans and specifications may be seen at the office of the City Engineer. (Oct. 19, p. 694.)

Decatur, Ala.—Surveyors are reported in the field for a bridge for the Louisville & Nashville to cross the Tennessee River several hundred yards below the Southern Ry. bridge.

Eddyville, Iowa.—The plans for the bridge to be built over the Des Moines River at this place for the Iowa Central Ry. may be seen at the *Railroad Gazette* office. The bridge is to consist of seven spans, each 136 ft. 6 in. long. The bridge was designed by Waddell & Hedrick, of Kansas City, Mo.

Elmwood, Ont.—Brant Township Council will take steps to have Crispin's bridge replaced by a new structure.

Fairview, Pa.—Reports state that the Erie County Commissioners have ordered plans and specifications made for a bridge over the Antietam River.

Grand Island, Neb.—Bids are wanted, until Nov. 14, according to report, for several combination bridges: C. H. Menck, County Clerk.

Hartford, Conn.—The Central New England R. R. will build a bridge over its tracks at Sigourney street.

Kansas City, Mo.—Engineer Kessler, of the Park Board, is reported to have been instructed to make plans for a bridge at Benton Boulevard, over the Belt Ry. tracks.

Lockport, N. Y.—The State Superintendent of Public Works, Albany, will receive bids, until Nov. 7, for an arch bridge over the Erie Canal at Pine and Lock streets, to be 40 ft. roadway. Appropriation $75,000.

Los Angeles, Cal.—The Board of Supervisors has under consideration plans and estimates for concrete culverts and arches for the county. One plan is for a bridge on Oak Knoll Road between Alhambra and Pasadena. Plans for three bridges on the county line south of La Mirada have been approved by the Board. When the plans are approved by Orange County bids will be wanted.

Lowell, Mass.—The City Engineer submitted to the Board of Aldermen an estimate of $35,000 for a steel bridge over London street.

Madison, Ind.—Bids are wanted, according to report, until Nov. 8, for the superstructure of a bridge over Indian Kentuck Creek. G. S. Taylor, County Auditor.

Mercer, Pa.—The County Commissioners will build a bridge at Chestnut street and another at Mill street, according to report.

Milwaukee, Wis.—Local reports state that the Chicago & Northwestern is considering the advisability of depressing its tracks in the Eighteenth Ward of the city and has submitted a proposition to a commission appointed for that purpose.

Montrose, Colo.—Bids are wanted, Nov. 14, for a bridge over the Uncompahgre River. T. W. Monell, County Clerk. (Oct. 19, p. 694.)

Mount Vernon, N. Y.—The State Board of Railroad Commissioners gave a hearing in New York City, Oct. 23, on the question of eliminating the grade crossing at Mount Vernon avenue and the New York & Harlem R. R. tracks. Surveyor George Drumbellen exhibited maps of the contemplated improvements which he estimates to cost between $300,000 and $400,000.

Muncie, Ind.—The Chicago, Indiana & Eastern R. R., according to report, is considering building a bridge across White River at Madison street. Fremont Wilson, Chief Engineer, Matthews, Ind.

Newport, Ky.—The Bellefontaine Bridge & Iron Co. has the contract for the viaduct in Covington for the South Covington & Cincinnati Street R. R.

New York, N. Y.—The Municipal Assembly has passed the resolution authorizing a bond issue of $4,000,000 for the New East River bridge.

Niagara Falls, Ont.—The Town Council has authorized bids be received for a new bridge over Muddy River at Buttery avenue.

North Adams, Mass.—We are informed that the city may contract early this winter for a plate girder bridge over the Hoosac River, to be built next spring. John H. Emigh, City Engineer.

Norway.—The Norwegian State Railroads, Christiana, is asking bids for 24 bridges and subways.

Pittsburgh, Pa.—Bids are wanted, at 10 a. m., Nov. 15, by Geo. W. Wilson, Director of the Department of Public Works, for rebuilding the substructure and superstructure of the South Tenth street bridge across the Monongahela River. Estimated cost $300,000. (Oct. 19, p. 694.)

Quincy, Mass.—We are informed that bids will soon be wanted by the Commissioners of Norfolk County at Dedham, Mass., for a steel bridge over Weymouth Fore River, estimated to cost $100,000.

Rapid City, Man.—D. E. B. Daly is receiving bids for a steel bridge across the Little Saskatchewan River.

Rock Island, Ill.—We are informed that there is no truth in the report that the Davenport, Rock Island & Northwestern will bridge the Mississippi River at Rock Island, but there has been some talk of building a bridge over the Rock River, but nothing certain is decided.

St. Albans, Vt.—The Central Vermont Ry., we are informed, has let contracts to the American Bridge Co. for steel bridges at Winooski, West Berlin, Northfield, East Granville, Royalton, West Hartford, and Richmond, and to the Detroit Bridge & Iron Works for 12 or 15 plate girder structures on the Southern Division.

St. Charles, Mo.—The St. Louis, St. Charles & Western (Electric) Ry., according to report, proposes to build a highway bridge over the Missouri River at St. Charles. J. D. Horseman, General Manager.

St. Mary's, Ont.—The Mayor of St. Mary's informs us that the bridge contemplated over Trout Creek at Wellington street will not be built this year.

Seabright, N. J.—The Board of Chosen Freeholders of Monmouth County have rejected the bids for the new drawbridge over the South Shrewsbury River at Seabright. Twelve firms submitted plans and estimates. In all 39 bids were offered, varying from $65,000 to $95,000. New bids will be wanted.

Southboro, Mass.—The Commission has found it necessary to remove the grade crossings of the Boston & Albany R. R. in Southboro. The State will pay 25 per cent. of the cost.

Townsend, Mont.—We recently reported that the County Commissioners would want bids for a 300-ft. steel bridge over the Missouri River near Hedges Ferry. The bids will be opened Dec. 7. Frank L. Currie, Engineer.

Troy, Ohio.—Reports state that bids are wanted, Nov. 2, for the substructure of the two canal bridges on Market street; also for an arch bridge over the race at the same point. N. K. Staley, City Engineer.

Turin, N. Y.—The State Superintendent of Public Works wants bids, Nov. 7, for the superstructure of a bridge over Black River at Pratt's Landing, between the towns of Greig and Turin, to consist of one fixed span 117 ft. long, and one swing span 130 ft. long.

Watertown, N. Y.—The State Superintendent of Public Works, Albany, will receive bids, until Nov. 7, for one riveted truss span for a swing bridge over the Champlain Canal, near Burton's saw mill.

Winnipeg, Man.—The City Council and the Canadian Pacific R. R. have agreed that the railroad build the proposed subway on Main street. It will be 65 ft. wide.

Other Structures.

Atlanta, Ga.—It is reported that the Southern Ry. has accepted the terms of the State to build a union station in Atlanta. Several plans for a $500,000 depot have been submitted to the Special State Commission.

Bremerton, Wash.—Admiral Mordecai T. Endicott, Chief of the Bureau of Yards & Docks, Navy Department, Washington, D. C., wants bids, until Nov. 10, for a brick and steel boiler shop 32 x 50 ft., at the Naval Station at this place.

Chicago, Ill.—The Paige Iron Works, on Ontario street, were destroyed by fire on Oct. 27. Estimated loss, $150,000.

Chihuahua, Mex.—The Chihuahua & Pacific Railroad is to spend upwards of $40,000 in the equipment of its shops.

Cragin (Chicago), Ill.—The plant of the Midland Rolling Mill Co. has been sold for $65,000 to the Block Manufacturing Co., recently organized with a capital of $130,000. The mill was built in 1898 to make bars and shapes. It comprises 10-in. and 9-in. trains and covers

two acres. P. D. Block is President; G. H. Jones, Vice-President, and L. E. Block, Secretary and Treasurer. The office is in the Marquette Bldg., Chicago.

ERIE, PA.—The Erie City Iron Works will immediately rebuild the machine shop destroyed by fire on Oct. 9. Bids are asked for the buildings which are to be much larger than the ones destroyed. New machinery will be wanted.

HALIFAX, N. S.—Reports state that the plant of N. Evans & Sons, ship repairers and boiler makers, has been sold. It is stated that large piers will be built; also a dry dock.

NEW ORLEANS, LA.—The New Orleans & Carrollton R. R. is building a car shop at Poplar and Dante streets, which will cost about $75,000. Adjoining the car shop will be a car shed to accommodate 50 cars. Both structures will be of steel construction.

NEWPORT, R. I.—The New York, New Haven & Hartford is reported to have begun work on a new passenger station in Newport.

NEW YORK, N. Y.—At the meeting of the Dock Board, Oct. 26, plans for extensive improvements on the East River water front were approved and ordered sent to the Commissioners of the Sinking Fund for approval. The improvements include a new bulkhead between Catherine Slip and Wall street, about 3,350 lineal ft. long, and the widening of South street throughout that distance from its present width to 125 ft. Eleven new piers are to be built in place of the 14 old piers, and each of the new structures will have an area four times greater than any of the old docks. The improvements will also involve rebuilding of seven ferry slips. The present plans as approved by the Board are an amendment to the plans originally prepared and approved in 1871.

OGDEN, UTAH.—The Rio Grande, according to report, will begin work on a new freight depot in Ogden.

PHILADELPHIA, PA.—Messrs. Hoopes & Townsend, of Philadelphia, have let a contract to the American Bridge Co. to build a boiler mill 70 x 500 ft., on the line of the Trenton cut-off of the Pennsylvania R. R.

PITTSFIELD, MASS.—Proposals will be received by the Board of Public Works of the City of Pittsfield, Mass., until 2:30 p. m., Nov. 20, for building a dam at Ashley Lake, in the Town of Washington, Mass. Some of the quantities estimated are as follows:

Excavation of trenches	1,800 cu. yds.
Filling, earth embankments	5,000 cu. yds.
Rock excavation, in trenches	500 cu. yds.
Hemlock lumber, in place	40,000 ft. B. M.
Concrete	2,900 cu. yds.
Rubble-stone masonry	775 cu. yds.
Coping stone, 8 ins. thick	3,340 sq. ft.
Cobble-stone paving	400 sq. yds.

James L. Bacon, G. W. Bailey, F. A. Smith, Board of Public Works. E. A. Ellsworth, Consulting Engineer.

PORTSMOUTH, N. H.—Bids are wanted, Dec. 1, for building a coal storage and handling plant of about 10,000 tons capacity and a quay wall at the Navy Yard. Edmiral Mordecai T. Endicott, Chief of the Bureau of Yards & Docks, Navy Department, Washington, D. C.

SOREL, QUE.—Bids will be received, Nov. 23, by Joseph R. Roy, Acting Secretary of the Department of Public Works, Ottawa, Ont., for building a pier and for dredging at Sorel. A check for $25,000 must accompany each bid.

TAMPICO, MEX.—The Mexico Jupiter Steel Co., of Tampico, Mex., and Pittsburgh, Pa., recently incorporated with a capital of $500,000, will soon begin work on its plant at Tampico. The company is making preparations to get bids for its many requirements.

TOPEKA, KAN.—We are informed that the Atchison, Topeka & Santa Fe will begin work at once on the blacksmith shop, which is to be a one-story structure 100 ft. wide and 400 ft. long, of brick and corrugated iron on steel framework. The other buildings will be begun when this structure is finished.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xi.)

American Institute of Electrical Engineers.

Beginning with November, the monthly meetings of the Institute will be held on the fourth Friday instead of the fourth Wednesday of each month. The next meeting will be held on Nov. 23.

Association of Civil Engineers—Cornell University.

The next regular meeting of the Association of Civil Engineers of Cornell University will be held in the Association room, Lincoln Hall, Ithaca, N. Y., at 2:30 p. m., Friday, Nov. 2. W. E. Wilson, Secretary.

Eastern Association of Officers in Charge of Car Service.

The next meeting of the Eastern Association of Officers in Charge of Car Service will be held on Thursday, Nov. 8, at 24 Park Place, New York. F. E. Higbie, Central R. R. of New Jersey, Jersey City, N. J., is Secretary and Treasurer.

The Car Foremen's Association of Chicago.

The regular meeting of the Car Foremen's Association of Chicago was held Thursday evening, Oct. 11, in the Monadnock Block. This was the annual meeting and about 75 were present. The report of the Secretary showed that 98 new members had been added during the year. The report of the Treasurer showed the Association to be in good condition financially. The election of officers resulted as follows: President, W. E. Sharp; Vice-President, J. C. Grieb; Treasurer, C. Deen; Secretary, Aaron Kline.

Canadian Roadmasters' Association and the Track Supply Association.

The following are the officers elected at the annual meeting in Montreal for the ensuing year: President, A. McAuley, of the Canadian Pacific Railway, Toronto Junction; Vice-President, J. R. Brennan, of the Pontiac Pacific Junction Railway, Ottawa; Secretary-Treasurer, J. Drinkwater, of the Canadian Pacific Railway, Winchester; Executive Committee, Messrs. J. Jelly, of the Canadian Pacific Ry., Carleton Junction; T. Graham, of the Canada Atlantic Ry., Ottawa; F. J. Holloway, of the Canadian Pacific Ry., Toronto Junction; and N. Delair, of the Canadian Pacific Ry., Montreal. It was decided that the next meeting of the Association should be at Hamilton, in the third week of October, 1901.

Railway Signaling Club.

The Annual Meeting of the Railway Signaling Club will be held in St. Louis, at the Southern Hotel, Nov. 13 and 14, beginning at 2:30 p. m. on Tuesday. Officers will be elected for the coming year. Arrangements have been made for a trip over the St. Louis Terminals in a special train and there will be an excellent opportunity to see the working of one of the largest terminals in the country. The hotel rates are $1.50 and upwards, on the European plan, and $3 and upwards on the American plan.

Papers will be presented on Automatic Signal Locations by C. C. Rosenberg (Lehigh Valley), and on "Some Questions About Progress and Uniformity," by B. B. Adams, Associate Editor of the *Railroad Gazette*. The Committee on Automatic Block Signal Failures Due to Lightning will also report. Members are requested to notify the Secretary, C. O. Tilton (West Milwaukee, Wis.) of their intention to be present.

The Engineers' Club of Philadelphia.

A business meeting of the Club will be held on Saturday, Nov. 3, at 8 o'clock p. m. The tellers will announce the result of the election of members. The topical discussion will be: "American Isthmian Canals," illustrated.

The Strength of the Ideal Column.

Mr. Carl G. Barth presented a paper upon the above subject, at the meeting, held Oct. 20. The paper consisted of a large number of mathematical deductions by which the limitations of the generally accepted formulas were pointed out and several new formulas were derived, one of the latter giving a value for the elastic limit, which the author claimed to be so nearly accurate that he called it the ideal formula. A consideration of the safe load on a practical column, which the author had intended to include in his paper, was but briefly touched upon on account of the lateness of the hour. The subject was discussed by Messrs. James Christie, Edgar Marburg and the author.

American Society of Civil Engineers.

At the stated meeting of Oct. 3 an amendment of the constitution was adopted which provides that the Nominating Committee shall be appointed at the Annual Meeting, and that this Nominating Committee shall meet at the Annual Convention (the summer convention) and nominate the candidates for the various offices. This change will overcome a number of the difficulties which have been met in practice under the constitution as it was.

At the meeting of Nov. 7 a paper will be presented by Mr. Joseph Mayer on "Canals Between the Great Lakes and New York," and one by Mr. George Y. Wisner on "The Economic Dimensions for a Waterway from the Great Lakes to the Atlantic." Both of these papers are published in the October issue of the Proceedings of the Society. On Wednesday, Nov. 21, the discussion of the subject introduced by these papers will be continued.

The Catalogue of the Library of the Society, which has been in preparation for some time, will soon be ready for distribution. It will be a volume of about 750 pages, uniform in size with the volumes of Transactions.

Roadmasters' Association of America.

The eighteenth annual convention of this association will be held in Los Angeles, Cal., Nov. 13, 14 and 15, 1900. Committees have been appointed to report on the following subjects:

Use of Tie Plugs in Hard and Soft Wood Ties.—Chairman, T. Hickey, M. C. R. R., St. Thomas, Ont.

Should Split Switch Points be Reinforced?—Chairman, H. W. Church, L. S. & M. S. R. R., Englewood, Ill.

Paper—Reversing Alternate Bolts in Joints.—G. W. Merrell, N. & W. R. R., Roanoke, Va.

Best Method of Tamping Ties in Various Kinds of Ballast.—Chairman, R. P. Collins, R. M., N. Y., N. H. & H. R. R., Readville, Mass.

Paper—Improvements in Permanent Way to Reduce Renewals and Interruptions to Traffic.—W. J. Prindle, Pennsylvania Co., Chicago, Ill.

Best Methods of Handling the Different Kinds of Ballast.—Chairman, W. E. Emery, C. & N. W. R. R., West Chicago, Ill.

Paper—Chemical Preservation of Cross Ties.—J. M. Meade, A. T. & S. F. R. R., Topeka, Kan.

Improved Track Tools.—Chairman, J. A. Prentice, L. S. & M. S. R. R., Toledo, Ohio.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. E. Van Tuyl, at one time Division Superintendent of the Erie in New York, died Oct. 25. He also served as Tax Agent of the Burlington road. Up to the beginning of the present year he was Manager of the Western Car Service Association at Omaha.

—Mr. James M. Schryver, General Passenger Agent of the Baltimore & Ohio, died suddenly Oct. 29. Mr. Schryver was born near Circleville, O., Dec. 20, 1848, and began his railroad career in 1873, serving as voucher clerk, rate and division clerk, chief clerk and assistant general ticket agent on the Baltimore & Ohio. In 1889 he was appointed Assistant General Passenger and then General Passenger Agent of the company.

—Mr. A. B. Plough, Vice-President and General Manager of the St. Paul & Duluth, recently taken over by the Northern Pacific, died at his home in St. Paul, Oct. 27. About two years ago Mr. Plough met with an accident on the Burlington road and his death is believed to have been due to injuries received at that time. He was born at Jacksonville, N. Y., and entered the railroad service in 1871 with the Central Iowa as baggageman. On Nov. 1, 1887, he became Assistant General Freight Agent and later General Freight Agent of the same road. The following year he became General Freight and Passenger Agent of the St. Paul & Duluth, then General Manager, and on March 1, 1891, Vice-President.

—Mr. C. R. Gray, the new Superintendent of Transportation of the St. Louis & San Francisco at St. Louis, Mo., was born Sept. 28, 1867. He entered railroad service with his present company, the St. Louis & San Francisco, Feb. 20, 1883, and has remained continuously with that company except that he was a joint employee with the Atchison, Topeka & Santa Fe during that company's ownership of the San Francisco. He served in the telegraph and station service, as chief clerk in the General Western Agent's office at Wichita, Kan., and then as Commercial Agent at Wichita until July 1, 1890. He was District Freight Agent at Carthage, Mo., to March 26, 1896, and Division Freight Agent at Wichita to Oct. 17, 1897. He was Superintendent of the Kansas division at Neodesha, Kan., to June 1, 1898, and of the Kansas and Oklahoma divisions at Monett, Mo., until Oct. 15 last.

—In 1858 Mr. F. W. Cram was selling papers on the Maine Central trains; he has just been elected President of the Bangor & Aroostook. Mr. Cram was born in Bangor, Me., June 21, 1846. After remaining with the Maine Central until 1870, serving as freight porter, freight clerk and assistant agent at Bangor, he became agent of the European & North American Ry. at Bangor, and continued with that company as General Freight Agent from Jan. 1, 1872, and as Superintendent from Oct. 27, 1875, until October, 1882, when the line was leased to the Maine Central. The leasing line then made Mr. Cram its General Eastern Freight Agent, and he held that position until May, 1885, when he became General Manager of the New Brunswick Ry. That road was leased to the Canadian Pacific in 1890, and he then became General Manager of his present company, the Bangor & Aroostook. He was elected Vice-President in December, 1894, and President in October, 1900.

ELECTIONS AND APPOINTMENTS.

Chicago & Eastern Illinois.—W. H. Richardson has been appointed General Passenger Agent, succeeding C. L. Stone, resigned.

Chicago Junction.—W. S. Weed, heretofore Freight Traffic Manager of the Toledo, St. Louis & Kansas City, now the Toledo, St. Louis & Western, has been appointed Traffic Manager of the C. J.

Chicago, Milwaukee & St. Paul.—C. N. Souther has been appointed General Agent of the Passenger Department, with headquarters at Chicago, Ill. His duties will resemble those assumed by Mr. Miller when he was Assistant General Passenger Agent. (See E. & A., Oct. 19, p. 695.)

Choctaw, Oklahoma & Gulf.—At a meeting of the Board of Directors held Oct. 5, Henry Wood, General Manager, was elected Vice-President, effective Nov. 1. This change was made at the request of Mr. Wood, in order that he might be relieved of part of the duties that devolved upon him as General Manager. The Vice-President will have supervision over the transportation and purchasing departments, and the General Superintendent and Purchasing Agent will report to him. The other departments will report to the President, who will also discharge the duties pertaining to the office of General Manager other than those having to do with the transportation and purchasing departments.

Colorado Midland.—H. C. Bush, heretofore General Agent at San Francisco, has been appointed Traffic Manager, with headquarters at Denver, Colo., effective Nov. 1.

Long Island.—The headquarters of President, W. H. Baldwin, Jr., and Secretary, F. E. Haff, also the Legal and Claim Departments, have been removed to 128 Broadway, New York city, effective Oct. 27.

Mexican Central.—The headquarters of Purchasing Agent, F. P. McIntyre, have been removed from Boston, Mass., to 52 Broadway, New York city, effective Nov. 1. G. O. Perkins has been appointed Superintendent of Telegraph, with headquarters at Mexico.

Missouri, Kansas & Texas.—W. V. Galbreath has been appointed General Live Stock Agent, with headquarters at Ft. Worth, Tex.

Mobile & Ohio.—The main line of this company has been reduced from three to two divisions, the Jackson division being abolished. J. D. Clark, who was Superintendent of this division at Jackson, Tenn., has been put in charge of the line from Mobile to Okolona at Meridian, Miss. H. W. Clarke has been appointed Superintendent of the St. Louis division at Cairo, Ill. The jurisdiction of C. S. Clarke, General Superintendent, has been extended over the mechanical, roadway and transportation departments.

New Jersey & Staten Island Junction.—The officers of this company referred to in the construction column are: President, Stephen M. Hoye, Brooklyn; Vice-President, Frederick Luchter, and Secretary and Treasurer, Horatio Judah.

Pittsburgh & Western.—H. D. Bulkley has been appointed Comptroller, with headquarters at Baltimore, Md., effective Oct. 22.

Rio Grande Western.—At the annual meeting of the stockholders held Oct. 22, W. Hinchman was elected a Director, succeeding the late B. Schlesinger.

St. Louis & San Francisco.—J. A. Quinn has been appointed Division Superintendent, with headquarters at Monett, Mo.

St. Louis Southwestern.—J. F. Lehane has been appointed General Passenger Agent of the St. Louis Southwestern of Texas, succeeding Fred H. Jones, resigned.

Seaboard Air Line.—W. H. Pleasants, Assistant General Freight Agent at Jacksonville, Fla., has resigned.

Southern.—The operating department of this company has been reorganized, to take effect Nov. 1, under which this system will be divided into two districts, Eastern and Western, each in charge of a General Superintendent. The Eastern District embraces the Washington, Danville, Charlotte, Richmond, Norfolk, Asheville, Savannah and Charleston Divisions and the Western will consist of the Knoxville, Memphis, Atlanta, Birmingham, Mobile and Louisville Divisions. Frank S. Gannon, Third Vice-President and General Manager, will be assisted by an Assistant General Manager, a General Superintendent of Transportation, two General Superintendents, a Superintendent of Motive Power, an Engineer of Bridges and Buildings and a Superintendent of Telegraph. Under the reorganization the following appointments were made: William H. Green, heretofore Assistant General Manager, becomes Assistant to the General Manager at Washington, D. C., in charge of United States mail service, the surgical, insurance, fuel and dining car departments and real estate leases. William H. Peddle becomes Assistant General Manager at Washington, D. C.; James H. Barrett, heretofore General Superintendent becomes General Superintendent of Transportation at Washington, D. C.; Joseph H. Sands, heretofore Superintendent becomes General Superintendent of the Eastern District at Salisbury, N. C.; John A. Dodson, heretofore Superintendent of Transportation becomes General Superintendent of the Western District at Chattanooga, Tenn.; David W. Lum becomes Engineer of Bridges and Buildings at Washington, D. C.; Thomas Bernard becomes Engineer Maintenance of Way at Chattanooga, Tenn., and Randolph Southgate Engineer Maintenance of Way at Salisbury, N. C. Both these gentlemen were heretofore Superintendents

of Track, Bridges and Buildings. A. Gordon Jones, heretofore Superintendent at Macon, Ga., becomes Superintendent of the Charleston Division at Charleston, N. C. The positions of General Superintendent of Maintenance, formerly held by Mr. Peddle, Assistant General Superintendent of Maintenance, held by Mr. Lum, Assistant General Superintendent, held by J. S. B. Thompson, Superintendent of Track, Bridges and Buildings and Superintendent of Transportation have been abolished. The line between Greenville, S. C., and Atlanta, Ga., becomes part of the Charlotte Division, and between Mooresville and Winston-Salem, N. C., with the Norwood and Taylorsville branches part of the Asheville Division. The lines between Atlanta and Brunswick and between McDonough and Columbus, Ga., become part of the Atlanta Division, and between Morristown, Tenn., and Asheville, N. C., part of the Knoxville Division.

Southern Pacific.—Chas. M. Hays, heretofore General Manager of the Grand Trunk, has been elected President of the S. P., succeeding the late C. P. Huntington. Mr. Hays will assume his new duties Jan. 1, next.

Union Pacific.—L. B. Merriam, Resident Engineer, having resigned, the jurisdiction of D. C. Dunlap, Resident Engineer at Laramie, Wyo., has been extended to include the duties formerly discharged by Mr. Merriam.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

Arcata & Mad River.—An officer writes that the extension to Janes Creek, Cal., is about six miles long, and the work is being done by the company's forces. (Oct. 19, p. 696.)

Arkansas Southwestern.—Surveys are completed and building is to be begun soon on the proposed extension from Pike City northwest to Murfreesboro. (Oct. 19, p. 696.)

Baltimore & Ohio.—Jennings Bros., of Philadelphia, are reported to have completed grading on an extension of the Salisbury Branch from Niverton, Pa., south about 12 miles to Bittinger, Md.

Beaumont Wharf & Terminal.—The Texas State Railroad Commission has granted authority to issue $100,000 bonds for completed improvements. (Aug. 10, p. 545.)

Bridge Railroad Company of Toledo.—This company's line is a connecting road between the new plant of the Toledo Bridge Co. and six railroads. It also gives belt connection with 17 other lines. The road was completed before the incorporation under contract of Kerlin Bros., Toledo. (Oct. 26, p. 711.)

Canada Atlantic.—The company is reported making extensive additions to its freight yards at the canal basin in Ottawa, Ont.

Canadian Pacific.—A tunnel about 1,000 ft. long is under consideration on the Crows Nest Pass Line, to do away with the long loop near Fernie, B. C.

Chicago & Northwestern.—The company has nearly completed an extension from Perkins, Mich., on the Peninsula Division, running northeast 7½ miles, thence north eight miles, thence a little west of north 7½ miles, in all 23 miles from Perkins. It is a lumber road and the estimated cost is $260,000. (Official.)

Choctaw, Oklahoma & Gulf.—Money has been appropriated, according to report, for 36 miles of the proposed extension from Weatherford, Okla. T., west toward Amarillo. (Construction Supplement, July 27, 1900.)

Colorado & Wyoming.—This company, controlled by the Colorado Fuel & Iron Co., of Denver, Colo., has filed new articles of incorporation in Colorado for additional lines in that state and Wyoming. A few months ago this company completed a line from Badger, Wyo., on the Colorado & Southern, northeast 16½ miles to Hartville. The new main line, as proposed, is to run from Colorado Springs north to Denver, and thence through Cheyenne, Wyo., to Sunrise, in Laramie County. The line is to be extended also from Colorado Springs south to Pueblo, thence to Trinidad and up the Las Animas River, with branches up Wild Cat Creek and other tributaries of the Las Animas River, tapping the mining territory south of Spanish Peaks. T. C. Osgood is President, and Wm. Porter, Chief Engineer, both of Denver. (Construction Supplement, July 27, 1900.)

Des Moines, Iowa Falls & Northern.—Grade stakes are being set, according to report, between Iowa Falls, Iowa, and Des Moines, and contracts will be let soon for grading. E. S. Ellsworth, of Iowa Falls, is president.

Duluth & Iron Range.—An officer denies that the company is building an extension north to Harding, Minn., as reported. (Oct. 19, p. 696.)

Duluth, Missabe & Northern.—An officer writes that his company has not under consideration any extension from Mount Iron, Minn., as reported in the press. (Oct. 19, p. 696.)

El Paso, Pecos Valley & Eastern.—This company was incorporated in New Mexico, Oct. 24, to build the Pecos Valley & Northeastern extension from Roswell, N. Mex., southwest 175 miles to El Paso, Tex. It is stated that the survey is completed and that building will be begun soon after election. (Oct. 26, p. 712.)

Great Northern.—Supplementary articles of incorporation have been field by the St. Paul, Minneapolis and Manitoba for the proposed extension from Wenatchee, Wash., to run north to a point near the mouth of the Okanogan River and thence to the international boundary with a branch east to the valley of the San Poil River near Republic, and another northwest via Spectacle and Palmer lakes to the intersection of the international boundary with the Semilkameen River. (Aug. 10, p. 546.)

Illinois Central.—An officer writes that there is no truth in the report that the company will build a cut-off from Independence, Iowa, southeast to Clinton. (Oct. 19, p. 696.)

The company is reported grading for 25 tracks to run along the levee on the Ohio River, at Brooklyn, Ill., opposite Paducah, Ky.

Illinois Southern.—Surveys are reported in progress for an extension across the river from Chester, Ill., southwest 40 miles to the St. Louis, Iron Mountain & Southern line of the Missouri Pacific in Missouri. The company is successor to the Centralia & Chester.

Lehigh Valley.—The proposition is being revived to induce this company to extend its Rochester & Hemlock Lake branch to a point on Conesus Lake, N. Y. (Aug. 25, 1899, p. 603.)

Little Rock Northern.—Surveys are reported completed on about 190 miles of this line from Little Rock, Ark., north 287 miles to Springfield, Mo. Andrew Johnson, of Mena, Ark., is Vice-President. (Construction Supplement, July 27, 1900.)

Minneapolis, St. Paul & Sault Ste. Marie.—The contract is reported let for 50 miles of extension from St. Croix Falls, Wis., northeast through Polk County toward Duluth and Superior.

Miscellaneous Companies.—The International Rapid Transit Co. has been incorporated in Delaware, with a capital stock of $1,100,000 to build railroads. The incorporators are: T. C. Frenyear, M. W. Comstock, H. B. Zimmerman, all of Buffalo, N. Y.; Tanner & Comstock, attorneys, Buffalo, N. Y.

Mississippi Roads.—The Williamsburg Lumber Co. and the Ellisville Lumber Co. are building two sections of a railroad to run from Ellisville west about 25 miles to Williamsburg. The section of the Ellisville Lumber Co., about 15 miles, is reported completed.

Nashville, Chattanooga & St. Louis.—An officer writes that the report very extensively circulated is incorrect that the company will build from Bon Air, Tenn., to Green Place, 17 miles. (Oct. 19, p. 696.)

New Jersey & Staten Island Junction.—Under this title a company has been organized to keep alive the franchises granted several years ago to Erastus Wiman, for a tunnel under New York Bay connecting Brooklyn with Staten Island. The officers and directors are given under Elections and Appointments.

New York & Ottawa.—The company has acquired by condemnation proceedings right of way over the lands of the Saratoga Lumber Co., for the extension south from Tupper Lake, N. Y., toward Long Lake.

Northern Pacific.—An officer writes that there is no foundation for the report that the Seattle & International is asking bids for extensions at Everett, Wash., as reported. (Oct. 26, p. 712.)

The company will build a spur about one mile long from its main track to the site of the military post, Fort Abraham Lincoln, near Bismarck, N. Dak. (Oct. 19, p. 696.)

Ohio River & Lake Erie.—The company is building an extension from Bergholz, Ohio, south three miles to the mine of The Burton, Beidler & Phillips Co. The material has been bought. Grading will be done mostly by the company's forces, but a part may be let to local contractors. It is expected that the work will be completed within three months. Improvements are also being made on the present line, including the raising and ballasting of track, putting in about one mile of new switches and the re-lining of one tunnel. The company also expects to replace several bridges. Surveyors are investigating the practicability of three or four suggested lines between the present terminus and the Pittsburgh, Cincinnati, Chicago & St. Louis. (Official.)

Pecos Valley & Northeastern.—See El Paso, Pecos Valley & Eastern.

Pennsylvania Company.—Swanson Bros., of Massillon, Ohio, have taken the contract for completing the unfinished line of the Ashland & Wooster, recently bought by this company. (Railroad News, Sept. 14, p. 614.)

Pere Marquette.—The citizens of Allegan, Mich., have voted right of way for an extension of the tracks into that city, about one mile.

Pittsburgh & Lake Erie.—The company is reported to have bought several acres of land at Groveton, Pa., for freight yards, opposite the southern end of Neville Island.

Porto Rico Roads.—The Executive Council of San Juan de Porto Rico on Oct. 29, is reported to have granted a franchise to the North American Co. to build and operate 300 miles of railroad in the interior of the island. The motive power is to be either steam or electricity and the work is to be completed in three years.

St. Louis & San Francisco.—With reference to the reported extensive improvements of the Kansas Midland, recently acquired by this company, an officer writes that it is the intention to maintain the K. M. in first-class operating condition, but not to make extensive improvements at this time. (Oct. 19, p. 696.)

Sharon & Butler.—The proposed line of the Sharon Steel Co., recently referred to (Pennsylvania Roads, Oct. 19, p. 696) is to be built under this title. It is to run from Sharon, Mercer County, Pa., to Wolf Creek, Butler County, about 30 miles. Surveys are in progress. Geo. W. Dorr, Pittsburgh, Pa., is President. (Official.)

The company was chartered in Pennsylvania with a capital stock of $600,000 on Oct. 29.

Shreveport & Red River Valley.—Epple & Hayes, who have a general contract, are reported to have sublet the first five miles south of Alexandria, La., to Mike Hune, of Shreveport. (Oct. 5, p. 662.)

Southern Pacific.—A contract was let Oct. 17 to Chas. Whener, of San Francisco, Cal., for double-tracking between San Bruno, about 15 miles south of San Francisco, to Milbrae, about two miles. The work must be completed within 90 days.

An officer denies that the company proposes building to the Slacks Canyon coal mines, near Bradley, Cal. Such a branch was considered many years ago. (Oct. 12, p. 680.)

Tennessee & Cumberland.—The line is to be extended, according to report, from Bear Spring, Tenn., west about five miles to Dover.

GENERAL RAILROAD NEWS.

Atlantic & Danville.—A distribution of 40 per cent. is due, Nov. 1, to the stockholders for the retirement of preferred stock, payable at the company's office, Norfolk, Va., or at the office of Messrs. B. Newgrass & Co., No. 7 Lothbury, London. (Aug. 3, p. 532.)

Baltimore & Ohio.—Otto H. Kahn, of Kuhn, Loeb & Co., has been elected a voting trustee to succeed the late Abraham Wolf.

Chicago & Southeastern.—Judge Baker, at Indianapolis, Ind., on Oct. 26 issued an order directing the company to appear before him Nov. 1 to show cause why it should not pay to the Special Master the balance of the money due for the purchase of the Fort Wayne, Terre Haute and Southwestern, or why the company should not be enjoined from running cars over the road and the property be re-sold. (Dec. 29, 1899, p. 902.)

Cincinnati, Georgetown & Portsmouth.—Of the $500,000 new 4 per cent. first mortgage bonds, $252,000 have been issued to take up the old first mortgage 5s. Preferred stock to the value of $125,000 has been issued for past due coupons.

Cincinnati Southern.—Judge Thompson, of the U. S. Supreme Court at Cincinnati, Ohio, has handed down a decision declaring void a contract made by the sinking fund trustees of Cincinnati in 1898, with Roberts & Co., New York, for the refunding of $15,600,000 of the C. S. bonds. (June 1, p. 364.)

Denver & Rio Grande.—The $1,587,500 first mortgage 7 per cent. bonds, matured Nov. 1, are payable after that date at the offices of Maitland, Coppell & Co., New York City.

Erie.—The company has issued $255,505 to the Central Car Trust Co., in car trusts, for box cars, payable in 28 instalments from Jan. 1, 1901, to Oct. 1, 1907.

Hocking Valley.—The New York Stock Exchange has listed $500,000 additional preferred stock, making the total listed to date $13,234,500. The additional stock is for acquiring car trusts and for additions and improvements to the Toledo & Ohio Central.

Houston & Texas Central.—The new mortgage on the Waco Division from Bremond, Tex., to Ross, 58 miles, secures an issue of 6 per cent. gold bonds at not to exceed $25,000 per mile, due May 1, 1930. The Central Trust Co., New York, is trustee.

Kansas City & Atlantic.—The Massachusetts Loan & Trust Co., as mortgage trustee, has brought suit at Kansas City, Mo., to foreclose the company's mortgage. The company was organized in June, 1893, as successor to the Chicago, Kansas City & Texas. The Kansas City & Northern Connecting, in January, 1897, bought a control of the property, including 17 miles from North Kansas City to Smithville, Mo., for use as part of its own main line from Pattonsburg to Kansas City.

Louisville & Nashville.—Fifty-five Evansville, Henderson & Nashville division bonds for $1,000 each, have been drawn for payment, Dec. 1, for the sinking fund at 110, interest to cease from that date. (March 30, p. 210.)

Missouri Pacific.—The refunding plan is reported completed which provides for the retirement of $3,952,000 St. Louis, Iron Mountain and Southern refunding notes and the issue in their place of $4,447,000 Iron Mountain 4s; the retirement of $6,712,000 Missouri Pacific funding notes, and the issue of $12,000,000 new debentures, including reserve or equipment notes to be retired, and the acquisition of the Kansas City and Northwestern by the issue of 30,000 shares of Missouri Pacific stock. (May 18, p. 330.)

Norfolk & Western.—Thomas Davant, General Freight Agent, is quoted as saying that his company, the Southern Ry., and the Chesapeake & Ohio, have entered into an agreement to build up the export traffic through Hampton Roads. There will be direct sailings to London, Liverpool, Hamburg and Rotterdam from both Norfolk and Newport News. To Antwerp, Glasgow, Amsterdam, Belfast and Dublin, the sailings will be from Newport News direct, and the N. & W. and the S. Ry. will deliver their freight for these points at Newport News.

Omaha & St. Louis.—Judge Amos Thayer, in the U. S. Circuit Court at St. Louis, Mo., on Oct. 29, denied the application of the Guaranty Trust Co., New York, and Julius Welsh, for the appointment of a separate receiver. (Sept. 28, p. 644.)

Pennsylvania.—No bonds are to be issued at present under the Schuylkill & Juniata, as the company has not completed its financial programme. The bonds of the constituent companies, except $2,000,000 of the Pennsylvania Schuylkill Valley, which were surrendered, remain for the present undisturbed. The interest on the remaining $5,000,000 bonds of the Pennsylvania Schuylkill Valley has been reduced to 3½ per cent. (Oct. 26, p. 712.)

Quebec & Lake St. John.—The directors have been authorized by the stockholders to issue prior lien bonds not to exceed £170,000, bearing interest at not more than 4 per cent., to be a first mortgage upon the property. This is under the reorganization plan. (Aug. 3, p. 532.)

Rutland.—O'Brien & Sheehan, of New York City, have filed an attachment against this company to the Rutland-Canadian for about $600,000 on account of work done on the new R.-C. line. The claim is disputed by the railroad company and it is said that the attachment will in no wise interfere with the completion of the road. (Aug. 31, p. 588.)

Seaboard Air Line.—Of the new 4 per cent. consols of 1900, of which $75,000,000 is authorized, there was outstanding, Oct. 1, 1900, and held by the Continental Trust Co., of Baltimore, under a pool agreement, $13,055,000; the Continental Trust Co., as trustee, held to secure $3,400,000 certificates of indebtedness, due 1902, $6,800,000; there was held by the New York Security & Trust Co., trustee, to secure $2,000,000 collateral trust guarantee bonds, $4,000,000; $29,725,000 is reserved to retire at maturity, dollar for dollar, all the underlying bonds of the various divisions, and $8,920,000 is held in the treasuries of the various companies of the system; $12,500,000 is issuable only after July 1, 1903, for additional properties, investments and extensions, not exceeding $1,500,000 for four years, and $1,000,000 per annum thereafter. The company's fixed charges, exclusive of car trust payments, are $2,329,700, and the net earnings for the year ended June 30, are reported at $2,634,061, which is about $300,000 more than necessary to cover the bond interest and rentals. (Oct. 12, p. 680.)

Southern Missouri & Arkansas.—This company, successor to the St. Louis, Cape Girardeau & Fort Smith, has issued only $425,000 of its $600,000 fixed interest 5s, and $400,000 deferred interest bonds. The company was incorporated in Missouri, May 3, 1899. (May 12, 1899, p. 345.)

Texas & New Orleans (Southern Pacific).—The Texas State Railroad Commission has authorized the issue of $1,470,869 first mortgage 4 per cent. bonds, at $13,500 per mile, on 109 miles of the Dallas extension, from Dallas to Athens, Tex.; from Rockland to Huntington, and Orange to Sabine River. (Sept. 7, p. 602.)

Wichita Falls.—This company, operated by the Missouri, Kansas & Texas, proposes to issue $250,000 bonds on its line from Wichita Falls, Tex., to Henrietta, 18 miles.